US 20020095316A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2002/0095316 A1

Toan et al. (43) Pub. Date: Jul. 18, 2002

(54) SYSTEM AND METHOD FOR OPTIMIZING BENEFIT PLAN DESIGNS

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(21) Appl. No.: 09/760,113

(22) Filed: Jan. 12, 2001

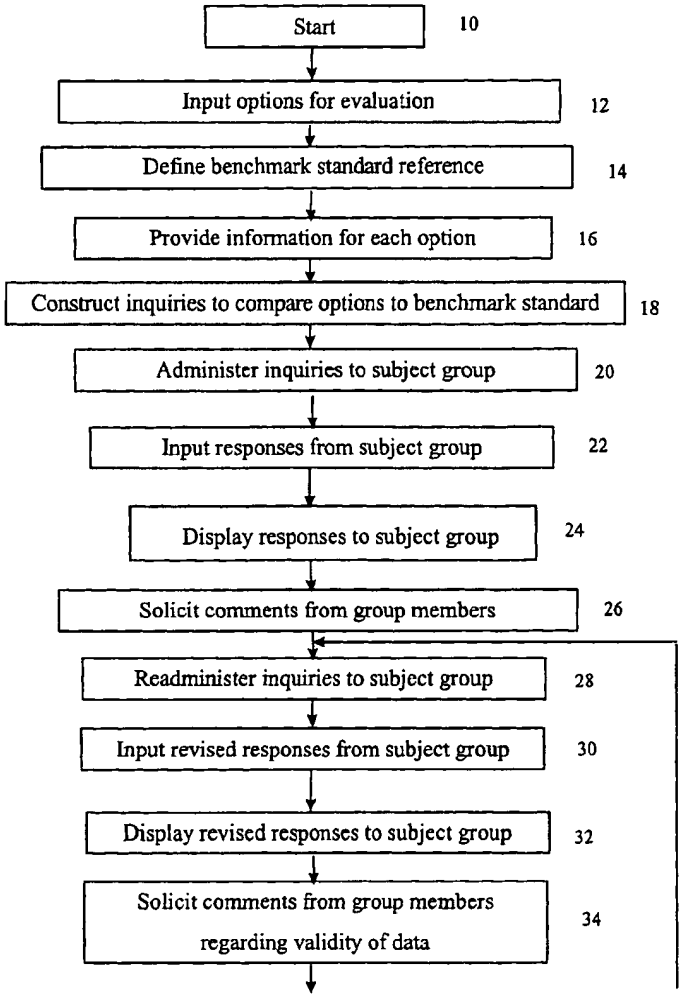
Publication Classification

(51) Int. Cl.[7] G06F 17/60

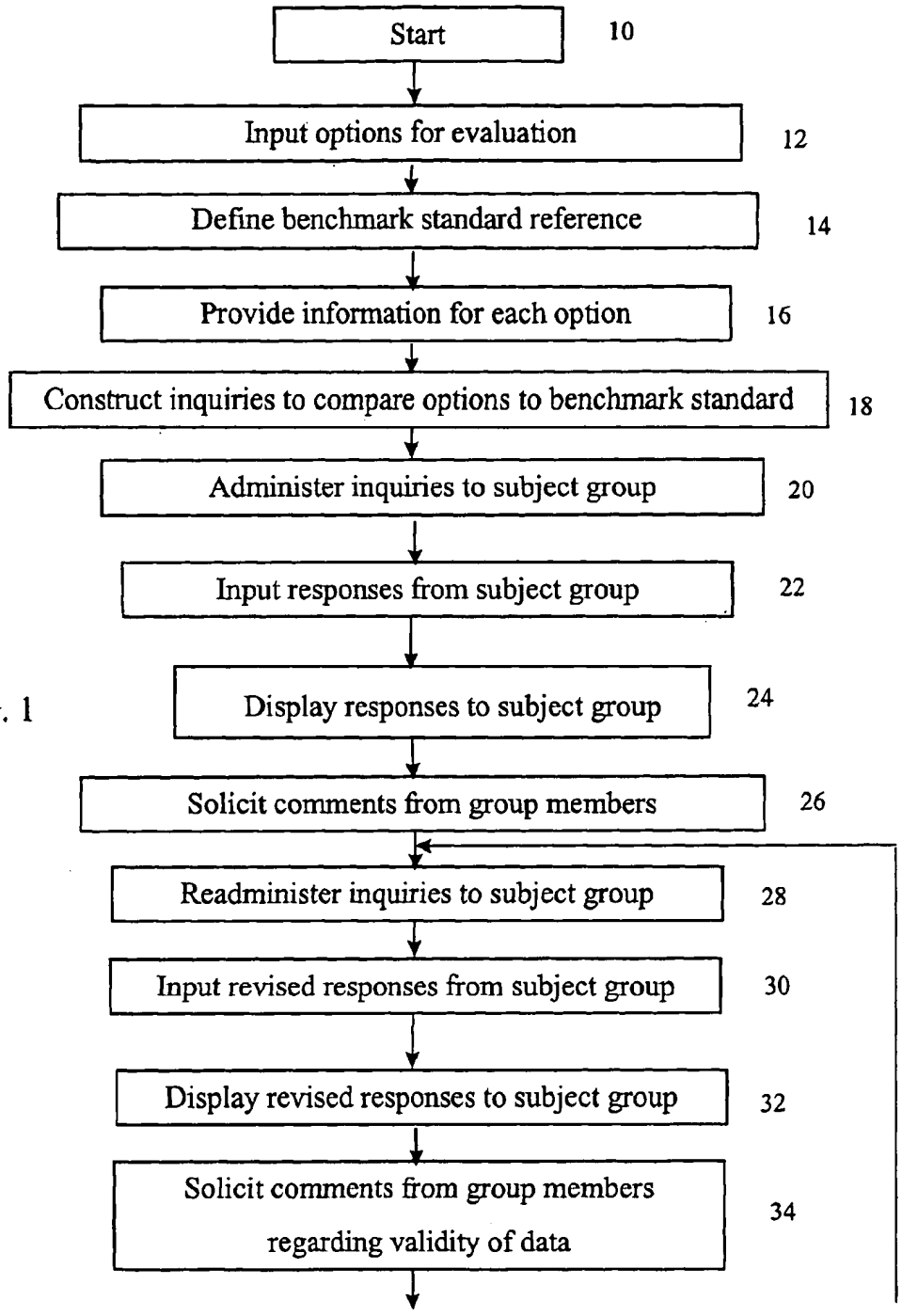
(52) U.S. Cl. 705/4

(57) ABSTRACT

A computer-based system and method to enable a benefit plan sponsor to design benefit plans for a given participant population by enabling the plan designer to select the plan design options that maximize the perceived benefit to the participant population subject to a cost constraint. The system prioritizes plan design options of such plans according to the costs of these options and the perceived benefits of these options for the participant population. Estimates of perceived benefit are based upon survey data from a sample of the given population or from historical survey data from population samples exhibiting analogous demographic characteristics to the given participant population regarding potential plan design options or analogous benefit plan design options.



claim 11
[106]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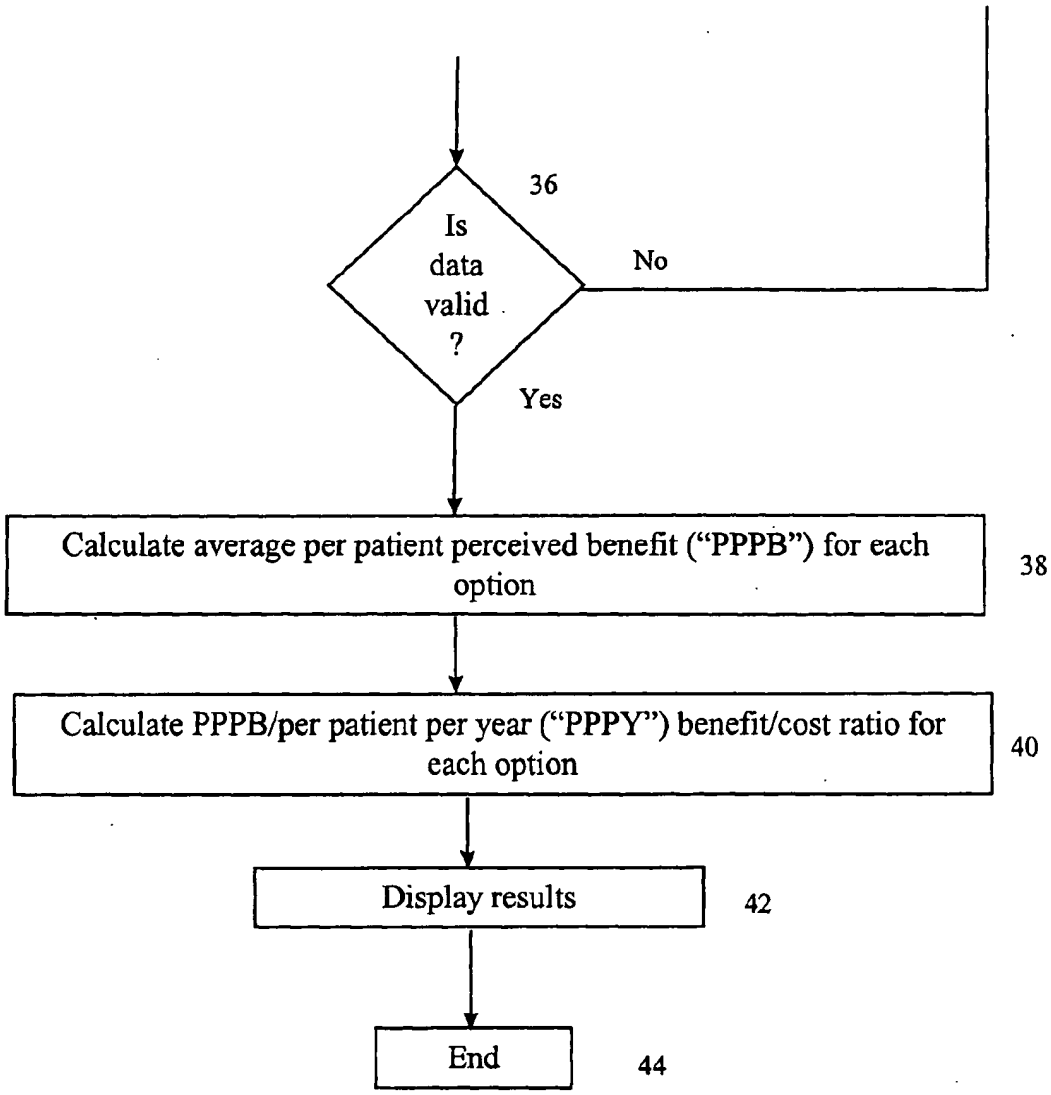
10
Input options for evaluation
12
Define benchmark standard reference
14
Provide information for each option
16
Construct inquiries to compare options to benchmark standard
18
Administer inquiries to subject group
20
Input responses from subject group
22
Display responses to subject group
24
Solicit comments from group members
26
Readminister inquiries to subject group
28
Input revised responses from subject group
30
Display revised responses to subject group
32
Solicit comments from group members regarding validity of data
34

FIG. 1


36
Is data valid ?
No
Yes
Calculate average per patient perceived benefit ("PPPB") for each option
38
Calculate PPPB/per patient per year ("PPPY") benefit/cost ratio for each option
40
Display results
42
End
44

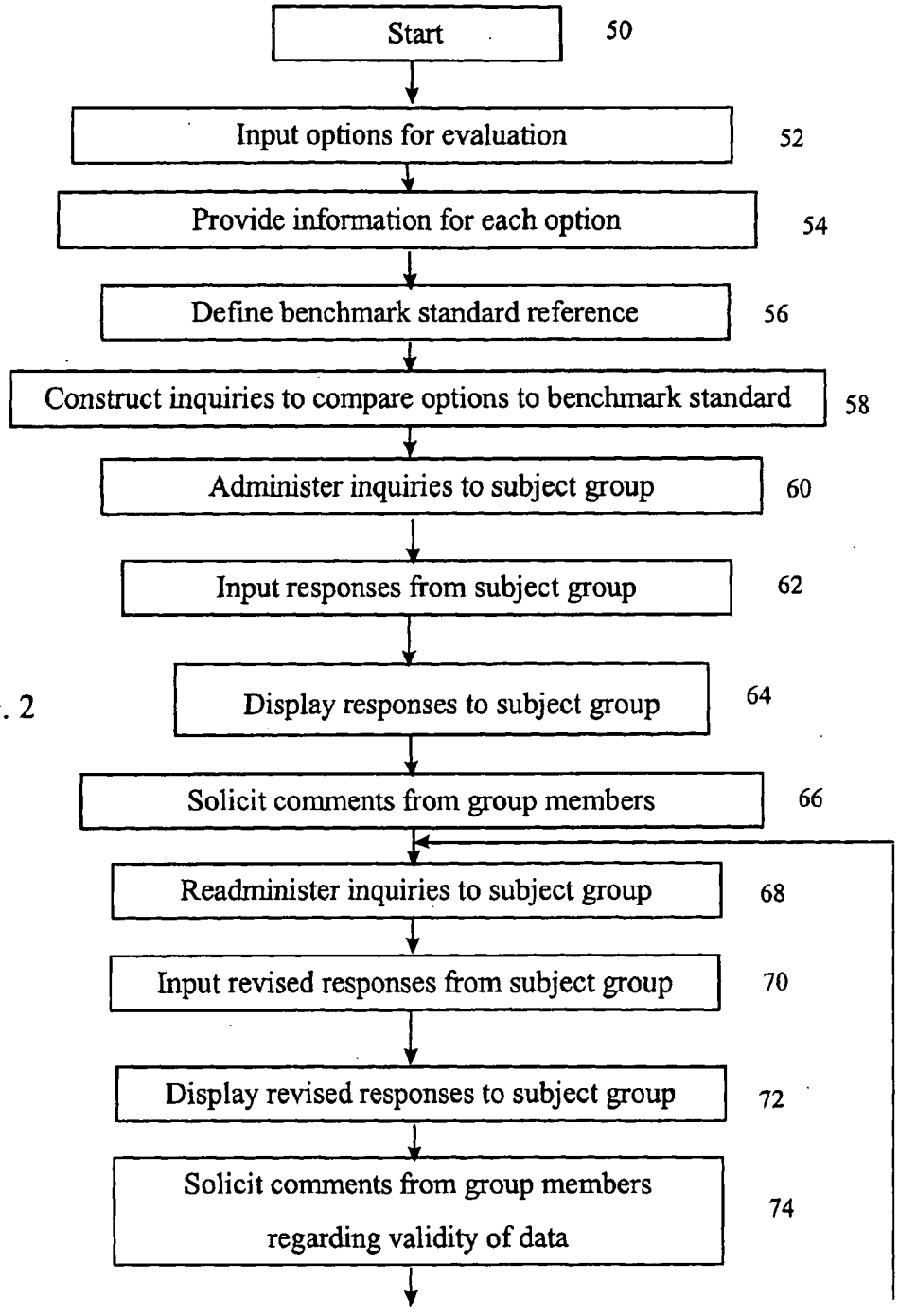
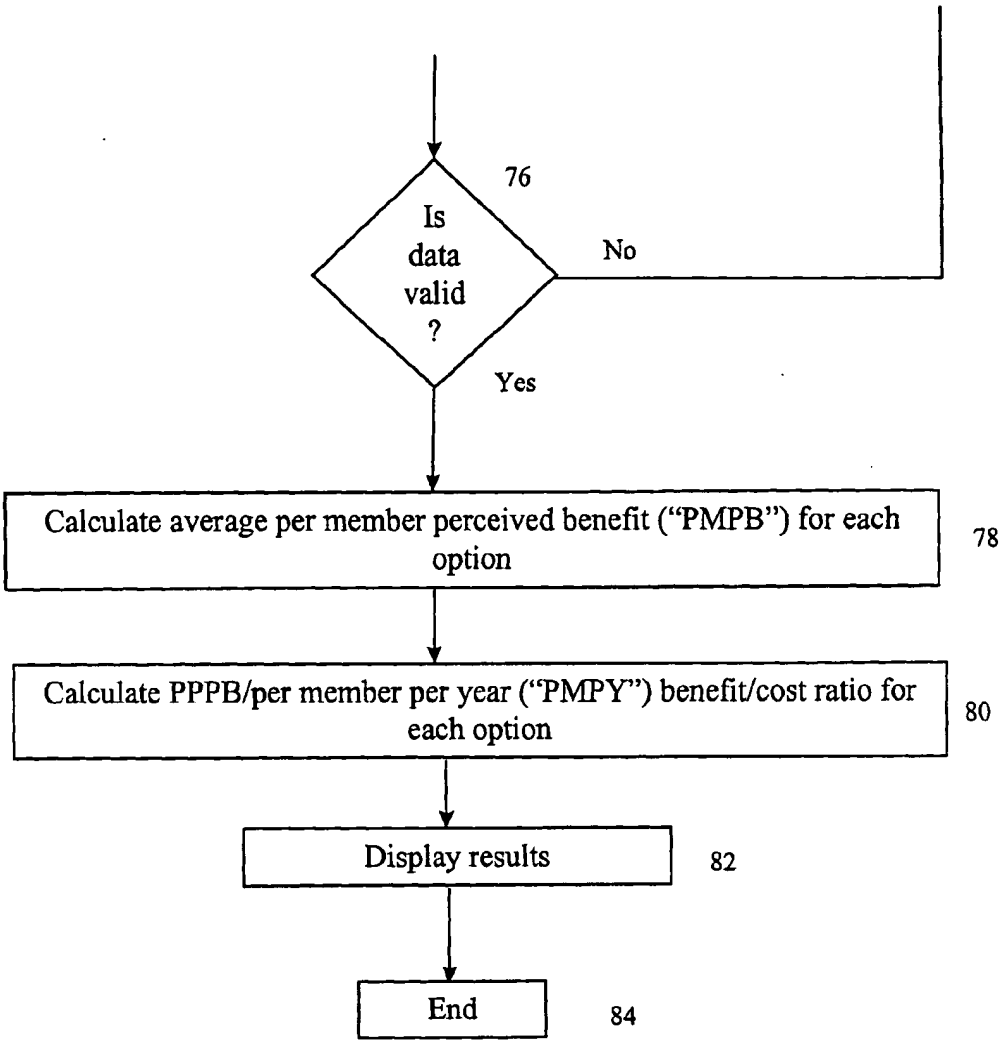

Start
50
Input options for evaluation
52
Provide information for each option
54
Define benchmark standard reference
56
Construct inquiries to compare options to benchmark standard
58
Administer inquiries to subject group
60
Input responses from subject group
62
Display responses to subject group
64
Solicit comments from group members
66
Readminister inquiries to subject group
68
Input revised responses from subject group
70
Display revised responses to subject group
72
Solicit comments from group members regarding validity of data
74

FIG. 2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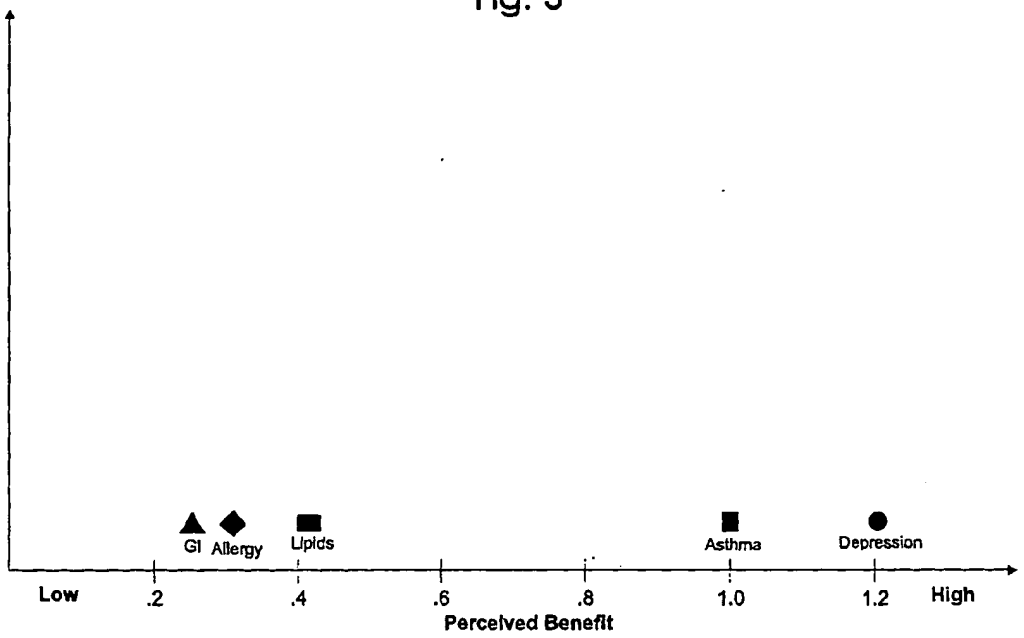
Is data valid ?
No
Yes
Calculate average per member perceived benefit ("PMPB") for each option
78
Calculate PPPB/per member per year ("PMPY") benefit/cost ratio for each option
80
Display results
82
End
84

Fig. 3


GI
Allergy
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Asthma
Depression
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1.0
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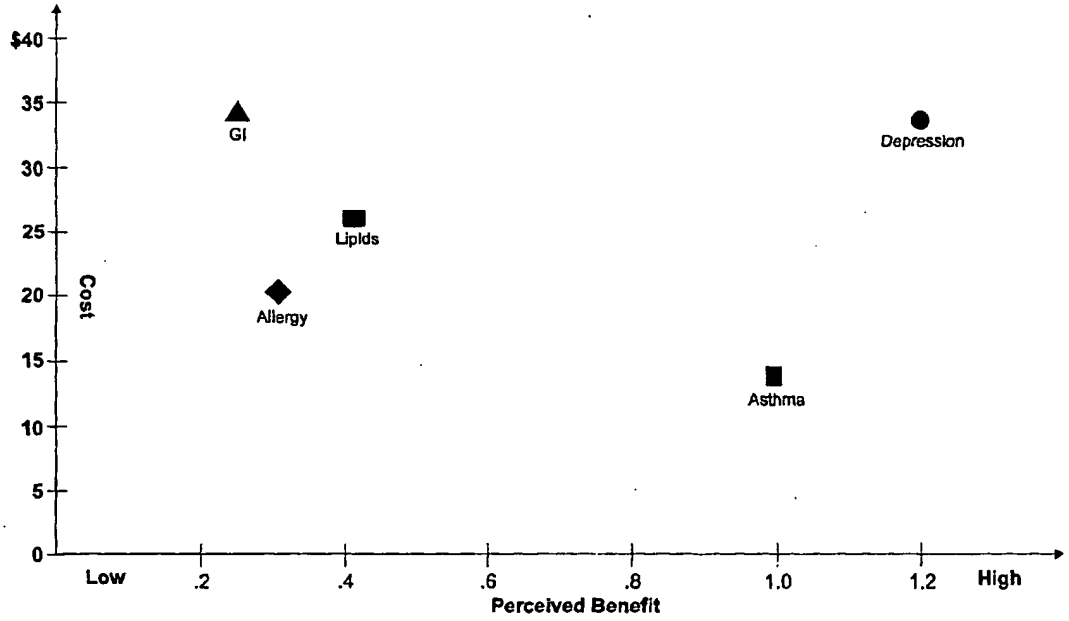
High
Perceived Benefit

Fig. 4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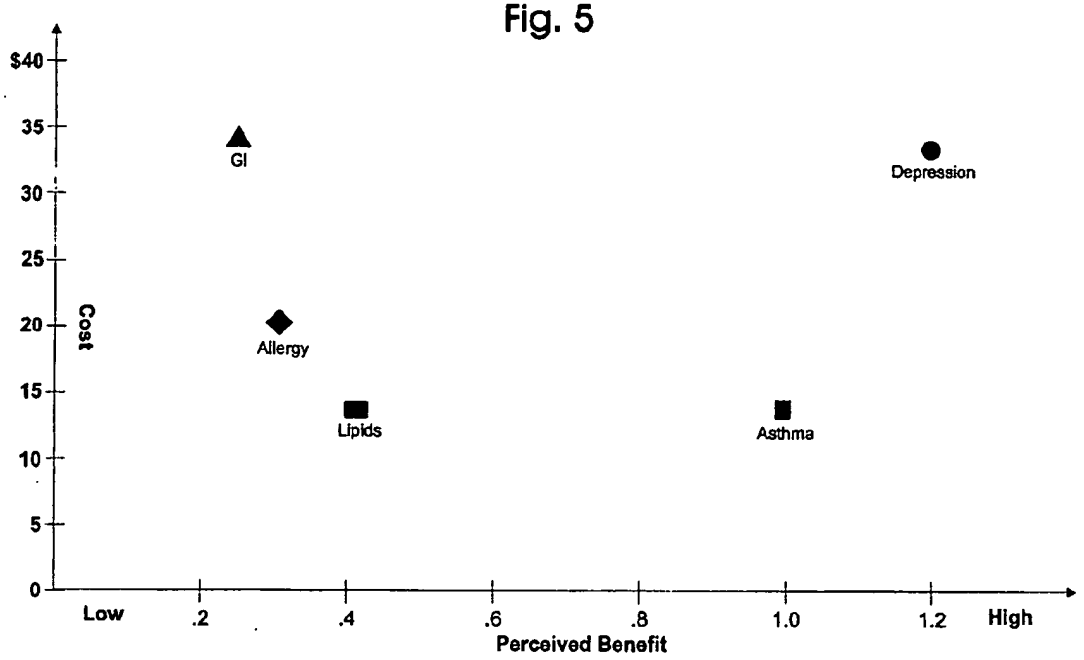
High
Perceived Benefit

Fig. 5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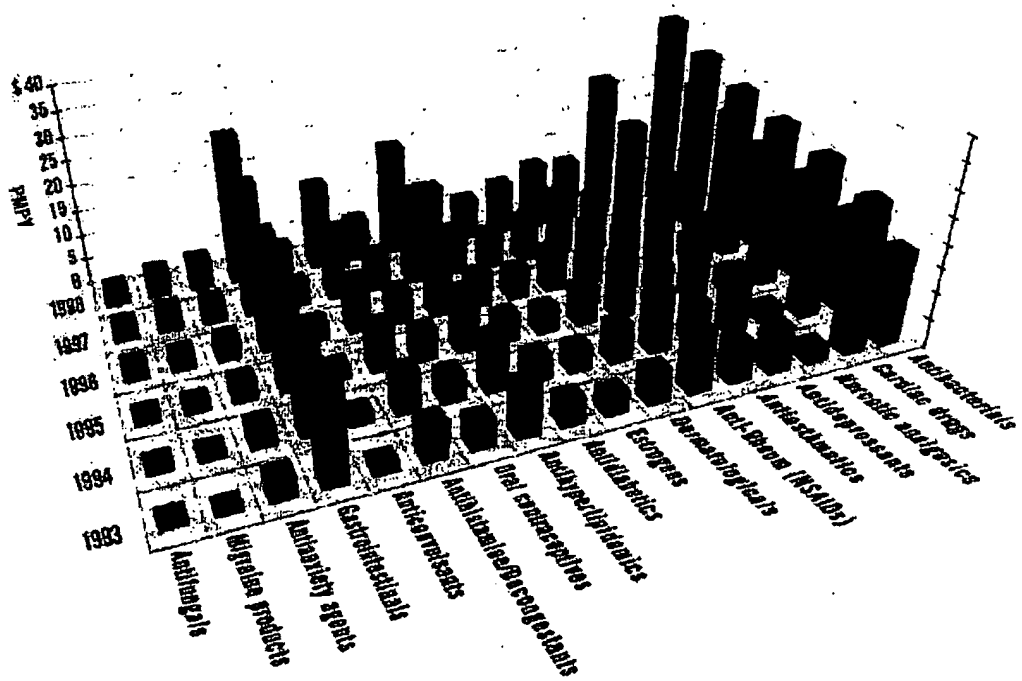
Perceived Benefit

Fig. 6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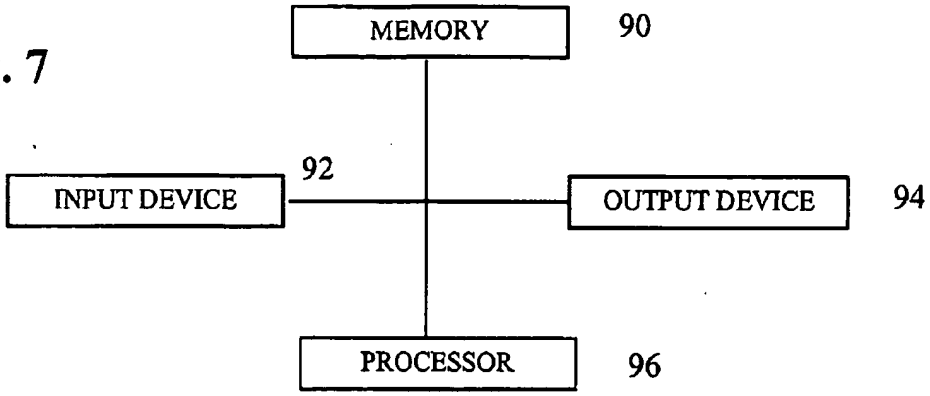
Migraine products
Antianxiety agents
Gastrointestinals
Antigonadals
Antihistamines/Decongestants
Oral contraceptives
Antihyperlipidemics
Antidiabetics
Estrogens
Dermatologicals
Anti-Rheum (NSAIDs)
Antidepressants
Narcotic analgesics
Cardiac drugs
Antibacterials

Fig. 7



SYSTEM AND METHOD FOR OPTIMIZING BENEFIT PLAN DESIGNS

FIELD OF THE INVENTION

[0001] A computer-based system and method for optimizing the design of benefit plans offered to a given participant population by preferably prioritizing plan design options that can be incorporated in such plans according to the relative perceived benefits derived from each option based upon, preferably assessment data from a sample of the participant population quantifying relative perceived benefits attributed to potential plan design options and/or historical assessment data from population samples exhibiting analogous demographic characteristics to the given participant population regarding potential plan design options or analogous benefit plan design options.

BACKGROUND OF THE INVENTION

[0002] Benefit plans that provide partial or complete reimbursement of expenditures incurred by participants in the plan are commonly offered by employers, associations, commercial entities and the like, that sponsor such plans as fringe benefits for employees or members or as a commercial service available to the general public. Potential sponsors of benefit plans are often constrained by resource limitations when making decisions about plan design options in the plans they offer to their participants. Lack of understanding of the relative perceived benefits attributed by the participants to the particular plan design options frustrates the efforts of sponsors to provide participants the most desirable plan design options within given cost constraints.

SUMMARY OF THE INVENTION

[0003] The present invention provides a new and unique process for, among other things, preferably developing or modifying benefit plans by enabling identification and incorporation of specific plan design options that maximize the perceived benefits derived from the plans by the given participant population by prioritizing the options according to the relationship between perceived benefit and the cost of providing the option. Using the perceived benefit data derived from the unique process, the present invention also preferably offers sponsors the ability to provide participants with benefit plans having plan design options most closely tailored to the participants' needs and desires. Through initial plan development or modification of plan design options in an existing plan, a plan incorporating those plan design options offering the maximum perceived benefit to participants at a given cost to the sponsor is achieved.

[0004] Broadly, in one aspect, the present invention concerns a computer-based method for evaluating a plurality of plan design options by comparing the cost of providing each option to the benefits of each option perceived by a group of one or more subjects comprising the steps of:

[0005] inputting the identification of the plan design options, a reference plan design option and the cost of providing each option;

[0006] providing the subject group with information about each plan design option and inquiries to elicit responses comparing each plan design option to the reference plan design option;

[0007] inputting data representative of the subject group responses;

[0008] calculating the average perceived benefit for each plan design option relative to the perceived benefit for the reference plan design option;

[0009] dividing the cost of providing each option by the calculated average perceived benefit for such option; and

[0010] outputting the calculated data.

[0011] Broadly, in another aspect, the present invention concerns a computer-based system for evaluating a plurality of plan design options by comparing the cost of providing each option to the benefits of each option perceived by a group of one or more subjects, comprising:

[0012] an input device for receiving input data,

[0013] a memory device connected to the input device for storing the input data,

[0014] a processor connected to the memory device which is programmed to perform operations upon stored data to produce output data, and

[0015] an output device connected to the processor for displaying the output data; and wherein the input device is capable of receiving data representing the identification of the plan design options, the reference plan design option, the cost of providing each option and responses of the subject group to inquiries comparing each plan design option to the reference plan design option; and the processor is programmed for calculating the average perceived benefit for each plan design option relative to the perceived benefit for the reference plan design option and dividing the cost of providing each option by the calculated average perceived benefit for such option.

[0016] Broadly, in another aspect, the present invention concerns a computer-based method for evaluating a plurality of plan design options by comparing the benefits of each option perceived by a group of one or more subjects to the cost of providing each option comprising the steps of:

[0017] inputting the identification of the plan design options, values of a plurality of statistical factors for each plan design option, and the cost of providing each option, and;

[0018] providing the subject group with information about each statistical factor and inquiries to elicit responses providing the relative weight of each statistical factor to be used in determining the perceived benefit of each plan design option;

[0019] inputting data representative of the subject group responses;

[0020] calculating the average perceived benefit for each plan design option relative to the perceived benefit for the reference plan design option;

[0021] dividing the cost of providing each option by the calculated average perceived benefit for such option; and

[0022] outputting the calculated data.

[0023] Other advantages, features, and aspects of the present invention are discussed below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] A full and enabling disclosure of the present invention, including the presently preferred mode thereof, to one of ordinary skill in the art, is set forth more particularly in the remainder of the specification, including reference to the accompanying drawings, in which:

[0025] **FIG. 1** is a flow chart illustration of the method of the present invention using per patient cost/benefit ratios.

[0026] **FIG. 2** is a flow chart illustration of the present invention using population-based cost/benefit ratios.

[0027] **FIG. 3** is an illustration of a graphical depiction of the relative perceived benefits of exemplar plan design options.

[0028] **FIG. 4** is an illustration of a graphical depiction of the relative perceived benefit of exemplar plan design options in conjunction with the costs associated with providing each option.

[0029] **FIG. 5** is an illustration of a graphical depiction of the relative perceived benefit of exemplar plan design options in conjunction with the costs associated with providing each option that demonstrates the effect of a modification in the cost associated with providing one such option.

[0030] **FIG. 6** is an illustration of a three dimensional graphical depiction of the historical perspective of the cost benefit analysis, which shows variations over time along the Z axis.

[0031] **FIG. 7** is an illustration of the system of one embodiment of the present invention.

[0032] The drawings are provided for illustrative purposes only and should not be used to unduly limit the scope of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] It is to be understood by one of ordinary skill in the art that the present discussion is a description of exemplary embodiments only, and is not intended as limiting the broader aspects of the present invention, which broader aspects are embodied in the exemplary constructions.

[0034] The method and system of the present invention may preferably be utilized in applications wherein contingent benefits are provided to participants as part of a plan which is underwritten (funded) by a sponsor, such as medical, health, dental, vision, pharmaceutical and other benefit plans. The invention may also preferably be used to design insurance plans covering life, casualty, liability and pet health care expenditures. The invention may preferably be used to optimize the design of plans within cost limitations established by or for the sponsor for an associated participant population, such as a plan an employer may sponsor as a fringe benefit for its employees. Alternatively, by identifying and selecting plan design options that generate perceived benefits to the participants such that participants are willing to pay amounts in excess of the sponsor's costs for participation in the plan, the system can be used to fashion plans that an entrepreneurial sponsor may offer to a predetermined market segment with an expectation of generating a profit.

[0035] The method and system of the present invention may also preferably be utilized by an individual to analyze plan design options from which a participant or prospective participant may select to design a benefit plan specifically tailored for the individual participant and/or the participant's dependents, such as family members. In designing such a benefit plan, the individual may be presented with an array of predetermined plan design options from which to select and/or the opportunity to create plan design options.

[0036] Although the present invention is described herein within the context of the preferred embodiment relating to the selection of plan design options which represent benefit attributes in pharmaceutical benefit plans, specifically evaluation of disease/treatment coverage options, it will be recognized by those skilled in the art that the system is not limited to disease/treatment coverage plan design options or to pharmaceutical plans. Rather, the present invention is applicable to many types of benefit and insurance plans to optimize the selection of options based upon perceived consumer benefits.

[0037] Pharmaceutical Benefit Plans

[0038] A pharmaceutical benefit plan sponsor typically develops a plan by selecting from among groups of predetermined plan design options, or by selecting one or more plan design options and, if appropriate, establishing the values of parameters associated with the selected plan design options. For example, a pharmaceutical benefit plan may comprise plan design options and associated benefit coverage parameters that preferably include: monthly fixed contribution payment amount, periodic deductible amount, transactional copayment amount, coinsurance payment percentage, stop loss limitation, benefit cap limitation, pharmaceutical formulary coverage, pharmaceutical rebate applicability, retail network availability, mail delivery option, and generic pharmaceutical coverage. As known in the field of benefit plan development, these terms are defined below:

[0039] monthly fixed contribution payment—a monthly fee paid by the participant

[0040] periodic deductible—an expenditure level below which the cost of the covered pharmaceuticals is borne by the participant (in some plans, until the deductible amount is met, the participant is extended the benefit of purchasing covered pharmaceuticals at the same price as paid by the sponsor)

[0041] transactional copayment—the amount paid by the participant in the purchase of a given pharmaceutical

[0042] coinsurance payment percentage—the proportional amount of the cost of a given pharmaceutical paid by the participant

[0043] stop-loss—a limitation on the out-of-pocket expenses for the participant, above which level the plan sponsor bears all costs

[0044] benefit cap—a limitation a benefit maximum, limiting the amount the plan will provide to a par-

ticipant or the participant and covered dependents, such that the participant bears all costs above the plan's cap

[0045] pharmaceutical formulary coverage—plan benefits that apply to specific predetermined pharmaceuticals for the treatment of a given condition

[0046] pharmaceutical rebate applicability—rebates that apply to purchases of specific pharmaceuticals

[0047] retail network availability—plan benefits that apply to purchases made at retail pharmacies

[0048] mail delivery option—plan benefits that apply to purchases of pharmaceuticals delivered by mail from predetermined suppliers

[0049] generic pharmaceutical coverage—plan benefits that apply to purchases of generic pharmaceuticals

[0050] Additionally, the sponsor may select disease/treatment coverage options, such as whether and to what extent identified treatments for specific disorders and/or types of disorders are to be covered by the plan. Disease/treatment coverage options may be classified according to inclusive groups of disease states, such as, for example: allergy; asthma; depression; gastrointestinal; and lipid disorders (e.g., hypercholesterolemia). Treatment coverage may also be categorized by the nature of the condition for which relief is provided, such as, for example, treatments that provide lifestyle maintenance, such as remedies for hair loss, as opposed to lifesaving treatments, such as insulin for diabetes. Although degree of coverage may be focused on alternative pharmaceuticals (e.g., low or no transactional copayment for a generic cholesterol-lowering medication, and a higher copayment for more expensive cholesterol-lowering medications), degree of coverage may also be varied based on the nature of the condition (e.g., lower transactional copayments for lifesaving treatments, and higher copayments for lifestyle enhancing treatments). Indeed, decisions about the degree of coverage can be based on the perceived health benefit associated with such treatments, or on the ratio of cost to perceived health benefit associated with such treatments. A preferred method for carrying out the subject invention can be described in the context of evaluating benefit plan options with respect to treatments for different types of medical disorders.

[0051] Selecting Disease/Treatment Groups for Evaluation

[0052] When used for the selection of disease/treatment coverage plan design options, the operation of the preferred embodiment of the invention commences with the input of disease/treatment group options that the sponsor deems as potentially desirable components of a plan to be offered to participants. One potential method of analyzing potential treatments is by classifying them into inclusive groups of disease states, such as, for example: allergy; asthma; depression; gastrointestinal; and lipid disorders (e.g., hypercholesterolemia).

[0053] Description of each Disease/Treatment Group Option

[0054] Next, descriptions of each disease/treatment group option and related information are prepared for presentation to a group of subjects, preferably selected from the participant population. The following information for each of disease/treatment group option under consideration may be provided to the subjects:

[0055] Description of the disease. This description should include information about the spectrum of disease and its effect on length of life, quality of life, and productivity.

[0056] Description of the disease/treatment group. This description should include the medications used for the disease/treatment group.

[0057] Description of the benefits resulting from the treatment, for example, prevention of one stroke per 100,000 people treated per year, relative to the consequences of no treatment or non-prescription approaches, such as lifestyle changes, for example, diet and exercise. This description may also include information about the variation in benefit derived by different patients. For example, use of cholesterol-lowering medications for patients who have experienced a myocardial infarction (heart attack) is likely to be perceived as providing more benefit than the use of those same medications for patients with slightly elevated serum cholesterol, in part because the latter can typically manage their symptoms by changes in diet or lifestyle.

[0058] Description of any side effects resulting from the treatment.

[0059] Defining a Reference Disease/Treatment Group

[0060] Next, a disease/treatment group, preferably one of the proposed disease/treatment group options, is selected as the reference disease/treatment group. Assessments of the perceived benefit of the remaining proposed disease/treatment group options will be made by comparison to the perceived benefit of the reference disease/treatment group. For example, anti-asthmatic medications for the management of asthma might be selected as the reference disease/treatment group. For determination of optimum allocation of medical treatment resources, a standard reference of perceived benefit, such as the benefit derived from treating 1,000 patients with asthma, may be used to quantify and thereby compare the perceived benefit of various disease/treatment group options. By eliciting feedback from a representative sample of the participant population regarding their subjective evaluations of the perceived benefit of coverage for each disease/treatment group option, a relative scaling of the benefit of the various disease/treatment group options may be established. Unless otherwise indicated, all references to cost/benefit analysis with respect to this invention relate to subjectively determined perceived benefit assessments.

[0061] Eliciting Subject Group Evaluations

[0062] In a preferred embodiment of the present invention, the determination of the relative cost/benefit can be based upon survey data from each individual participant, or from a statistical sample (subject group) of the given participant population. The subject group(s) may comprise potential benefit plan participants, such as employees or patients, as well as benefit plan managers and health care providers. If more than one group is surveyed, results are preferably

generated for each group, along with a summary encompassing the results of all groups. Once the subject group has reviewed the information regarding the disease/treatment group options, the survey assessment is commenced.

[0063] The assessment questions and descriptions for each of the disease/treatment group options of a preferred embodiment of the present invention may be conveyed to the subject group through a variety of media including, for example, overhead projector, lecturer, computer monitor, graphical user interface ("GUI"), Internet, e-mail, CDROM, cellular telephone display, PDA display, printout, facsimile, mail or other method of image, data or document transmission. Similarly, in a preferred embodiment of the present invention, the inputting of plan options and the responses of the subject group may be accomplished by the subject, an interviewer or other operator through a variety of input devices including, for example, keyboard, keypad, Internet access device, e-mail, voice recognition program, telephone, cellular telephone, pager, PDA, GUI, or other voice or data input device, including, for example, keying in or scanning information from a source document marked or punched by the subject.

[0064] The quality of the assessments may be enhanced by appropriately preparing the subjects. One approach is to inform the subjects of the need to make decisions concerning the benefit plan coverage, specifically that not all medications needed to treat all diseases can be fully covered. Subjects may be informed that if all medications were fully covered, due to cost constraints, other benefits, such as vacation time, may need to be reduced or eliminated. Subjects may also be requested to imagine that they are members of an advisory board convened by their employer to provide advice about which medications should be covered, and to what extent. This exercise aids the subjects in understanding how their assessments can be used by sponsors to make benefit plan decisions.

[0065] An example question to elicit subjective evaluations of the perceived benefit of a disease/treatment group option, such as treating arthritis patients with non-steroidal anti-inflammatory drugs ("NSAIDS"), may be stated in the following form: "treating 1,000 asthma patients with anti-asthmatics provides the same benefit as treating how many rheumatoid arthritis patients with NSAIDS?" By similarly questioning subjects regarding other types of proposed treatments in comparison with the same reference disease/treatment group option (e.g., anti-asthmatics for asthma patients), numerical data can be collected on each subject's relative per-patient perceived benefit of each disease/treatment group option.

[0066] For example, if a subject indicates that treating 1,000 patients with anti-asthmatics is equivalent to treating 2,000 arthritis patients with NSAIDS, then that subject's per-patient perceived benefit for NSAIDS among arthritis patients is 1,000/2,000=0.5. In other words, treating two patients with NSAIDS generates the same perceived benefit as treating one patient with anti-asthmatics. High perceived benefit treatments are generally those that are life sustaining, such as insulin for diabetes, whereas low benefit treatments are typically those that are considered "lifestyle" drugs, such as remedies for hair loss.

[0067] In soliciting assessment of the perceived benefit, certain criteria can be suggested for evaluation. These criteria may include effects of treatment on length of the patient's life, quality of life, and productivity in the workplace or home environment. In addition, the timing of these effects (e.g., immediate results versus 15 years in the future) and the availability of non-prescription alternatives (e.g., changes in lifestyle) may also be considered. Further, the spectrum of disease and variation in the appropriateness of use of the treatment may also be considered. For example, use of cholesterol-lowering medications among patients with a history of myocardial infarction ("heart attack") has been demonstrated to improve longevity. However, use of those same medications among patients with mildly elevated serum cholesterol and no evidence of coronary artery disease offers substantially less benefit; in addition, such patients may be able to effectively manage their cholesterol through changes in diet and exercise. All of these issues may be relevant for, subjects considering the overall perceived benefit.

[0068] Perceived benefit may optionally be derived from a cumulation of the subject's responses to separate inquiries into an explicit set of component benefit criteria, such as length of life, quality of life, and productivity. In this approach, the relative benefit for plan design option is determined for each specific criterion, and a combining rule that defines the relative weight attributed to each criterion is applied to determine the overall perceived benefit for each plan design option. This approach allows the subjects to focus on one benefit criterion at a time, by providing responses assessing the perceived benefit of each plan design option for each criterion. These assessments may be made relative to the reference plan design option or based on an absolute scale associated with the benefit criteria, such as a rating scale from zero to one hundred representing a range of the plan design option providing no benefit with respect to that criterion to providing the maximum benefit possible for the criterion.

[0069] Once the benefit of the plan design option has been assessed for each benefit criteria, a combining rule may be applied across the assessments for the benefit criteria to obtain an overall perceived benefit for the plan design option. The combining rule preferably results in the overall perceived benefit for a given plan design option being monotonically increasing with the recognition of an assessed perceived benefit in each of the benefit criteria.

[0070] For example, length of life, quality of life, and productivity may be chosen as the benefit criteria for a component-based assessment. An example question to elicit subjective evaluations of the perceived benefit of treating arthritis patients with NSAIDS with respect to the quality of life criterion may be stated in the following form: "In terms of quality of life alone, treating 1,000 asthma patients with anti-asthmatics provides the same quality of life benefit as treating how many rheumatoid arthritis patients with NSAIDS?" If a subject indicates that in terms of the quality of life benefit provided, treating 1,000 patients with anti-asthmatics is equivalent to treating 2,000 arthritis patients with NSAIDS, then that subject's relative perceived quality of life benefit for NSAIDS among arthritis patients is 1,000/2,000 =0.5. Similar questions can be utilized to assess the relative benefit for the plan design option for each of the benefit criteria. For example, if NSAIDS provide no length of life benefit, the relative perceived length of life benefit is 0, whereas if NSAIDS provide a productivity benefit equiva-

lent to that offered by anti-asthmatics (i.e., in terms of productivity alone, treating 1,000 patients with anti-asthmatics is equivalent to treating 1,000 patients with NSAIDS), the relative productivity benefit is 1.0.

[0071] Once the relative benefit for each of the benefit criteria for a given plan design option (e.g., 0 for length of life, 0.5 for quality of life, and 1.0 for productivity) has been assessed, a combining rule can be applied to determine the overall perceived benefit for the plan design option. Such a rule defines the relative weight accorded to each specific benefit criterion. These relative weights can be determined by querying the subject group.

[0072] One approach for determining the relative weights for the combining rule is to focus on the reference plan design option. An example question to elicit the subjective weight for productivity relative to quality of life may be stated in the following form: "The quality of life benefit from treating 1,000 asthma patients with anti-asthmatics is equal to the productivity benefit from treating how many arthritis patients with anti-asthmatics?" If, for example, the quality of life benefit from treating 1,000 asthma patients is equal to the productivity benefit from treating 2,000 asthma patients, then the relative weight for productivity is 0.5 (=1,000/2,000). Similarly, if, for example, the quality of life benefit from treating 1,000 asthma patients is equal to the length of life benefit from treating 5,000 asthma patients, then relative weight for length of life is 0.2 (=1,000/5,000). By definition, the relative weight for quality of life would be 1.0.

[0073] One possible combining rule is to multiply the relative weight for each benefit criteria times the subject's assessment of that benefit criteria for a given plan design option, and to sum these products for each benefit criterion to determine the perceived benefit for the given plan design option. The resulting value is then divided by a similar value calculated for the reference plan design option. For example, if the relative weights for length of life, quality of life, and productivity are defined as 0.2, 1.0, and 0.5 respectively, the perceived benefits from NSAIDS for length of life, quality of life, and productivity are assessed as 0, 0.5, and 1.0 respectively, and the perceived benefits from anti-asthmatics are 1.0, 1.0, and 1.0 respectively (by definition), then the overall perceived benefit from NSAIDS would be $[(0.2\times0)+(1.0\times0.5)+(0.5\times1.0)]/[(0.2\times1.0)+(1.0\times1.0)+(0.5\times1.0)]=0.59$.

[0074] Additionally, the perceived benefit for some benefit criteria may be related directly to measurable statistical factors. In such situations, these statistical measures may be used directly as the measure of relative benefit for those benefit criteria. For example, in assessing the benefit criterion of relative productivity, if the use of NSAIDS among patients with rheumatoid arthritis reduces lost time from work by 5 days per year, and the use of antiasthmatics reduces lost time from work by 6 days per year, then the relative productivity benefit from NSAIDS is 0.83 (5 days/6 days). Because these statistical factors may be observable and measurable, this approach allows increased objectivity in the assessment of overall perceived benefit for those benefit criteria while reducing the number of assessments required from the subject group.

[0075] Providing Feedback to the Subject Group

[0076] Although a wide range in the tabulated perceived benefit values may be expected based upon the composition of the subject group, the range of variation of the perceived benefit values may be substantially narrowed by providing feedback of the entire subject group's cumulative responses to each subject and then allowing the subject group to reevaluate the benefit associated with the disease/treatment group option under consideration. A graphical depiction of the distribution of the subjects' per-patient perceived benefit for each disease/treatment group option may inform each subject as to whether his or her perception is in general conformity with the remainder of the group. Additionally, subjects may be provided with a graphical depiction of the results of other subject group assessments, such as groups comprising benefit managers, physicians, pharmacists, and employees.

[0077] Facilitating Subject Group Discussion

[0078] Additionally, by facilitating communications between the members of the subject group regarding the thought processes underlying their assessments of the disease/treatment group options, the subjects can receive beneficial insights into the subject group's overall perceptions of the relative benefits derived from the each disease/treatment group option, further promoting consensus upon reevaluation. In the preferred embodiment of the present invention, discussion among the subjects may be facilitated with focused questions relating to specific segments of the displayed assessment distribution, such as "what issues of this treatment might support a perceived benefit at the upper end of the distribution?" Similarly, a question such as "what rationale is there for responses in the middle of the distribution?," elicits responses from subjects supporting the median perceived benefit assessments. The responses to such inquiries may be instructive to subjects whose responses fall in the extreme ranges of the perceived benefit distribution and may contribute to a more cohesive grouping of responses in subsequent assessments.

[0079] Subject Group Reevaluation

[0080] Upon completion of the feedback/discussion session, subjects may again be requested to provide responses to the same questions initially posed on the disease/treatment group options being considered. The revised results may be displayed to the subject group, and a more narrow distribution of the above-described values will often be observed. At this time, discussion is preferably focused on any exceptional or deviant data by asking subjects whether there were any misunderstandings regarding the process or the results. If no irregularities are noted, the data can then be used to determine average perceived benefit for the disease/treatment group options being assessed.

[0081] Calculation of Cost/Benefit Ratios

[0082] Upon completion of the benefit assessment and the input of data reflecting survey responses and treatment costs, the relative costs and perceived benefits can be displayed, and cost/benefit ratios of the proposed disease/treatment group options can be calculated. As more fully detailed below, two methods of conducting the cost/benefit analysis comprise comparing per-patient costs to per-patient perceived benefit and comparing population-based costs to the population-based perceived benefit. Although these two approaches generate different cost and benefit data, the resulting cost/benefit ratios are identical.

[0083] Per-Patient Perceived Benefit

[0084] Per-Patient Perceived Benefit ("PPPB") is a measure of the perceived benefit derived from treating a defined number of patients. For example, if a group's responses indicate that, on average, treating 1,000 patients with anti-asthmatics is determined to be equivalent to treating 2,000 rheumatoid arthritis patients with NSAIDS, then the per-patient perceived benefit for NSAIDS is 0.5. In other words, treating two patients with NSAIDS generates the same benefit as treating one patient with anti-asthmatics. By contrast, if the group's responses also indicate that treating 1,000 patients with anti-asthmatics is determined to be equivalent to treating 500 seizure patients with anti-epileptic drugs, then the per-patient perceived benefit for anti-epileptics among patients with seizure disorders is 2.0. In other words, it is the perception of the subject group that treating two patients with anti-asthmatics generates the same benefit as treating one patient with anti-epileptic drugs.

[0085] To compare costs and benefits using this approach, costs must be estimated on a per-patient basis. Per-patient costs for providing coverage of a disease/treatment group option can be calculated by dividing the overall cost for the treatment by the number of patients in the disease/treatment group option. These annual per-patient costs for each disease/treatment group option can then be plotted against the associated per-patient perceived benefit, as shown in **FIG. 4**. Since the cost of coverage of a disease/treatment group option is necessarily dependent upon the degree of coverage offered by the sponsor, variations in the degree of coverage affect the cost, and hence the vertical (cost) location of the disease/treatment group option plots. For example, if it is assumed that the cost of treating lipid disorders is $26 per year per patient and the sponsor bears 100% of the cost of treatment, i.e., no copayment is required from the participant, the rectangular "Lipid" plot in **FIG. 4** depicts this cost information, in connection with the indicated 0.4 perceived benefit relative to the 1.0 for the "Asthma" reference disease/treatment group option. If the plan coverage for treating lipid disorders only is modified such that the sponsor bears only 50% of the cost of this treatment, i.e., a 50% copayment is required from the participant, with the $26 per year per patient cost remaining unchanged, the rectangular "Lipid" plot in **FIG. 5** depicts this modified cost to the sponsor of $13 per year per patient, with the unchanged 0.4 perceived benefit relative to the 1.0 for the "Asthma" reference disease/treatment group option.

[0086] Population-Based Perceived Benefit

[0087] Population-Based Perceived Benefit ("PBPB") is a measure of providing a particular treatment option to an entire population. Per-patient perceived benefit may be converted to perceived benefit for the participant population by incorporating a factor representing the prevalence of treatment for each condition in the population relative to the reference condition (e.g., asthma). Specifically, PBPB can be calculated by multiplying the prevalence of that disease/treatment group option and then dividing by the prevalence of the reference disease/treatment group option. If, for example, the prevalence of the disease/treatment group option under consideration is 10%, and the prevalence of the reference disease/treatment group option is 5%, the population-based perceived benefit for the disease/treatment group option under consideration is twice (i.e., 10% divided by 5%) the per-patient perceived benefit for that disease/treatment group option.

[0088] To compare costs and benefits using this approach, costs must be estimated on a population basis. Typically, these costs are estimated on a per-member per-year ("PMPY") basis. PMPY is the annual cost of the medications used in a disease/treatment group option in a population divided by the number of members in that population. PMPY costs can then be plotted against population-based perceived benefit.

[0089] Once the relative perceived benefits and costs of treatment options have been determined, the ratio of cost to perceived benefit can be calculated, either on a per-patient or population basis.

[0090] Treatment Costs

[0091] The cost to the sponsor of providing treatment for each disease/treatment group option may reflect only the direct cost of purchasing the required medication, or alternatively the total cost to the sponsor of providing the treatment, including the sponsor's administrative costs and other indirect expenses associated with the treatment, such as any necessary monitoring that accompanies the treatment. Optionally, the costs may further be defined to include the consequential beneficial effects of the treatment, specifically the avoidance of future expenses resulting from failing to provide the treatment when required, or offsets in other healthcare costs avoided. This cost analysis approach would include, for example, the expected cost savings resulting from reduced hospitalizations for acute exacerbations of asthma attributed to use of anti-asthmatic medications. This approach of including the avoidance of future expenses as a benefit which offsets the sponsor's current costs may provide a more meaningful estimation of the actual costs incurred by the sponsor in providing a comprehensive long-term benefit plan covering a participant's total health care costs. Additionally, although it is not a cost related to medical treatments, in situations where the sponsor is also the participant's employer, the benefit of avoiding lost worker productivity due to early treatment of a medical disorder may also be included in the analysis.

[0092] Per-Patient Cost/Benefit Ratios

[0093] The per-patient cost/benefit analysis involves comparing per-patient costs to the per patient perceived benefit. For example, in a population of 10,000 members, 1,000 members may receive medications for asthma, and 4,000 may receive medications for gastrointestinal disorders. If the annual medication cost per patient being treated for asthma is $500, and the perceived benefit per patient treated for asthma is 1.0 (by definition), then the per-patient cost/benefit ratio for asthma is calculated as $500 ($500/1.0). Similarly, if the annual medication cost per member being treated for gastrointestinal disorders is $1,000, and the benefit per patient treated for gastrointestinal (GI) disorders is 0.5 (i.e., the population sample has determined that treating a GI patient provides half the benefit of that associated with treating an asthma patient), then the per-patient cost/benefit ratio for GI is $2,000 ($1,000/0.5).

[0094] Population-Based Cost/Benefit Ratios

[0095] The population-based analysis involves comparing population-based costs to the population-based perceived

benefit. For example, using the above hypothetical facts, the total asthma medication cost is $500,000 ($500/patient×1,000 patients) and the total asthma perceived benefit is 1,000 (1.0×1,000). When spread across the entire population of 10,000 members, the asthma medication cost is $50 per member per year (PMPY=$500,000/10,000 members), and the benefit is 0.10 (1,000/10,000). The population-based cost/benefit ratio for asthma is therefore $500 ($50/10.10).

[0096] Similarly, the total GI medication cost is $4,000,000 (=$1,000/patient×4000 patients). The total GI benefit is 2,000 (=0.5×4,000). When spread across the entire member population, the GI medication cost is $400 per member per year (PMPY,=$4,000,000/10,000 members), and the benefit is 0.20 (=2,000/10,000). Therefore, the population-based cost/benefit ratio for GI is $2,000 (=$400/0.20).

[0097] Interpretation of Results

[0098] In a preferred embodiment of the present invention, once the cost/benefit ratios have been determined, they are preferably presented to the sponsor, participant or other user for review and, if desired, for modification of plan benefit coverage.

[0099] By displaying the relationship between perceived benefit and costs graphically, such as depicted in **FIG. 4**, a comparison of the cost-effectiveness of the disease/treatment group options under consideration is illustrated. As in **FIG. 4**, when the perceived benefit is depicted along the X axis and the cost is depicted along the Y axis, those treatments with cost/benefit plots extending to the lower right side of the graph are the most cost-effective treatment options, whereas those tending towards the upper left-hand portion of the graph represent those that are relatively less cost-effective.

[0100] Additionally, a historical perspective of the cost/benefit analysis may be illustrated by using a three dimensional graphical illustration which shows variations in cost/benefit ratios over time along the Z axis, as illustrated in **FIG. 6**.

[0101] Using the graphical depiction such as illustrated in **FIG. 4**, any single line emanating from the origin represents combinations of cost and perceived benefit that have identical cost/benefit ratios. Disease/treatment group options with cost/benefit values above the line exhibit higher cost/benefit ratios (i.e., are less cost-effective) than those on the line; disease/treatment group options with cost/benefit values below the line have lower cost/benefit ratios (i.e., are more cost-effective) than those on the line. Ideally, the ratio between cost and benefit for each covered disease/treatment group in a plan should remain constant, with cost/benefit ratios for each disease/treatment group option falling on a single line. By focusing on options with relatively high cost/benefit ratios, a benefit plan administrator can design a benefit plan to bring cost and benefit for disease/treatment group options in closer alignment with the desired balance.

[0102] Alternatively, cost/benefit analysis results can be depicted in tabular numeric form, as a ratio of the anticipated cost divided by the perceived benefit. By numerically ranking the proposed treatment options according to the perceived cost/benefit ratio, a plan administrator may prioritize plan options based upon their relative cost-effectiveness (i.e., those with the lowest cost/benefit ratios are the most cost-effective).

[0103] The present invention may also be used to depict the cost/benefit ratios for each plan design options in a benefit plan before and after a proposed or implemented modification to highlight the effect of the plan modification.

[0104] Additionally, if desired, the selection of plan options incorporated in a proposed plan can be automatically implemented by the computer processor to obtain a projected cost consistent with the sponsor's objectives. Using this approach, plan design options having the lowest cost/benefit ratios are successively selected for incorporation into the plan and the cumulative cost of providing each treatment for the participant population is determined. Progressively higher cost/benefit (less cost effective) options are thus incorporated into the plan design until the sponsor's objective cost is met.

[0105] Alternatively, the relative cost/benefit ratios for the plan design options may be inferred from historical benefit assessments of the same or analogous plan design options made by the given participant population or by demographically analogous population samples.

[0106] Referring now to **FIG. 1**, **FIG. 1** is a flow chart illustration of the system of one embodiment of the present invention using per-patient cost/benefit ratios. The process commences in Step **12** with the input of disease/treatment group options under consideration for inclusion in the plan. In Step **14**, a reference disease/treatment group option for comparison with other disease/treatment group options is defined. In Step **16**, information related to each disease/treatment group is provided to each survey subject. In Step **18**, inquiries are constructed to elicit responses from the subjects that will provide numerical comparisons of the benefits attributed to each disease/treatment group under consideration with respect to the reference disease/treatment group. In Step **20**, the inquiries developed in Step **18** are administered to the subjects through any of several possible media, including individual or group electronic display, printed document, artificial or human voice, overhead projector or personal electronic communication device, such as computer terminal, laptop computer, PDA, pager or cell phone. In Step **22**, responses from each subject are input for processing.

[0107] In Step **24**, the cumulative group responses are displayed to the subjects, preferably by graphical depiction, such as illustrated in **FIG. 3**. This data may be displayed in a variety of formats, including plotting each individual PPPB response ranging from a low value through a high value along a perceived benefit axis, where each subject indicated a value for X such that treating X patients with the disease of interest was equivalent to treating 1,000 patients with asthma. The information displayed in Step **24** may then be used in Step **26** to prompt discussion among subjects. This group communication may be conducted either in the same physical proximity or through electronic communication means with one another, such as by telephone conference call, Internet communication or other communication means allowing near real time interaction among subjects and a moderator.

[0108] With the insight gained from the overall group perception, along with the comments of subjects in evaluating these results, in Step **28** the subjects may elect to revise or confirm their original responses to the survey inquiries. Upon completion of the input of the revised responses in

Step 30, in Step 32 the revised responses may be displayed to the subjects in the same manner as in Step 24. In Step 34, comments from the subjects are solicited regarding any potential misunderstandings or miscommunications that may have resulted in the input of erroneous data, or other reasons for altering subject responses. At Step 36, if comments from subjects lead to the conclusion that further assessments are warranted, the process proceeds back to Step 28 for readministration of the inquiries to the subjects. The process thus continues until comments from the subjects indicate that valid data has been obtained in Step 34.

[0109] Once the validity of data is assured in Step 36, the data are used to calculate average per patient perceived benefit values for each disease/treatment group in Step 38. In Step 40, the average per-patient per year cost of providing such treatment is divided by the per-patient perceived benefit to determine the per-patient cost/benefit ratio for each disease/treatment group. Finally, in Step 42, the results may be displayed either as tabular results of the computed cost/benefit ratios for each disease/treatment group or alternatively in a graphical format depicting per-patient perceived benefit values along the first axis and the per-patient costs associated with each disease/treatment plotted on the second axis.

[0110] FIG. 2 is a flow chart illustration of the present invention using population-based cost/benefit ratios. Steps 50 through 82 of this process are essentially the same as illustrated in Steps 10 through 42 of FIG. 1, with the exception that in Step 78 the data is used to calculate population-based perceived benefit estimates for each disease/treatment group option, and in Step 80, the average per-member per-year cost of providing such treatment is divided by the population-based perceived benefit to determine the cost/benefit ratio for each disease/treatment group.

[0111] FIG. 7 is an illustration of the system of one embodiment of the present invention. In FIG. 7, the computer apparatus comprises an input device 90 for receiving input data, a memory device 92 connected to the input device 90 for storing the input data, a processor 94 connected to the memory device 92, that is programmed to perform operations upon stored data to produce output data, and an output device 96 connected to the processor 94 for displaying the output data.

[0112] Although preferred embodiments of the invention and preferred methods of practicing the same have been shown and described herein, persons of ordinary skill in the art will recognize and appreciate that the invention encompasses and includes numerous modifications and variations thereto without departing from the spirit and scope of the present invention. In addition, it should be understood, and persons of ordinary skill in the art will recognize, that aspects of the various preferred embodiments discussed herein may be interchanged or eliminated both in whole or in part. Furthermore, those of ordinary skill in the art will appreciate the foregoing description is by way of example only, and does not and is not intended to limit the scope, nature and/or variations of the invention.

What is claimed is:

1. A method for using a computer apparatus for evaluating a plurality of plan design options that can be incorporated into a benefit plan offered to a given participant population by comparing the cost of providing each option to the benefits of such option perceived by a group of one or more subjects,

the computer apparatus comprising an input device for receiving input data, a memory device connected to the input device for storing the input data, a processor connected to the memory device which is programmed to perform operations upon the stored data to produce output data, and an output device connected to the processor for displaying the output data,

the method comprising the steps of:

inputting the identification of the plan design options and a reference plan design option and the cost of providing each option;

providing the subject group with information about each plan design option and inquiries to elicit responses comparing each plan design option to the reference plan design option;

inputting data representative of the subject group responses;

calculating the average perceived benefit for each plan design option relative to the perceived benefit for the reference plan design option;

dividing the cost of providing each option by the calculated average perceived benefit for such option; and

outputting the calculated data.

2. The method of claim 1 wherein the subject group is comprised of members of the participant population.

3. The method of claim 1 wherein the cost of providing each plan design option is expressed in terms of per-patient per year costs and the average perceived benefit is expressed in terms of per-patient perceived benefit.

4. The method of claim 1 wherein the cost of providing each plan design option is expressed in terms of per-member per year costs and the average perceived benefit is expressed in terms of per-member perceived benefit.

5. The method of claim 1 further comprising the steps of

displaying data representative of the responses to the subject group;

readministering the inquires to the subject group to elicit revised responses comparing each plan design option to the reference plan design option; and

inputting data representative of the revised responses of the subject group to the inquiries;

and wherein the data representative of the revised responses is used to calculate the average perceived benefit for each plan design option.

6. The method of claim 5 further comprising the step of

soliciting comments from the subjects regarding their responses to the inquiries.

7. The method of claim 6 further comprising the step of

providing the comments from the subjects regarding their responses to the inquiries.

8. The method of claim 5 further comprising the step of

soliciting comments from the subjects regarding validity of the revised responses.

9. The method of claim 1 wherein the subject group is comprised of one participant.

10. The method of claim 1 further comprising the step of inputting the identification of the plan design options incorporated in a given plan design and wherein the step of outputting the calculated data comprises identifying the output data which relate to the plan design options incorporated in the given plan design.

11. The method of claim 1 wherein the responses of the subject group comprise data representing each subject's assessment of a plurality of benefit criteria for each plan design option compared to the reference plan design option and wherein each subject's perceived benefit for each plan design option is determined according to a relative weight defined by the subject for each specific benefit criterion.

12. The method of claim 11 further comprising the step of inputting values for at least one statistical factor related to each plan design option; and wherein each subject's perceived benefit for each plan design option comprises the product of a relative weight defined by the subject to be accorded each statistical factor multiplied by the value of such statistical factor for such plan design option.

13. A computer based system for evaluating a plurality of plan design options that can be incorporated into a benefit plan offered to a given participant population by comparing the cost of providing each option to the benefits of such option perceived by a group of subjects, the system comprising:

an input device for receiving input data,

a memory device connected to the input device for storing the input data,

a processor connected to the memory device which is programmed to perform operations upon stored data to produce output data, and

an output device connected to the processor for displaying the output data;

the input device capable of receiving data representing the identification of the plan design options, the reference plan design option, the cost of providing each option and responses of the subject group to inquiries comparing each plan design option to the reference plan design option; and

the processor programmed for calculating the average perceived benefit for each plan design option relative to the perceived benefit for the reference plan design option and dividing the cost of providing each option by the calculated average perceived benefit for such option.

14. The system of claim 13 wherein the input device is capable of receiving data representing revised responses of the subject group to the inquiries which have been readministered following displaying data representative of the responses to the subject group; and wherein the data representative of the revised responses is used to calculate the average perceived benefit for each plan design option.

15. A method for using a computer apparatus for evaluating a plurality of plan design options that can be incorporated into a benefit plan offered to a given participant population by comparing the cost of providing each option to the benefits of each option perceived by a group of one or more subjects,

the computer apparatus comprising an input device for receiving input data, a memory device connected to the input device for storing the input data, a processor connected to the memory device which is programmed to perform operations upon the stored data to produce output data, and an output device connected to the processor for displaying the output data,

the method comprising the steps of:

inputting the identification of the plan design options, values for each of a plurality of statistical factors related to each plan design option, and the cost of providing each option, and;

providing the subject group with information about each statistical factor and inquiries to elicit responses providing the relative weight of each statistical factor to be used in determining the perceived benefit of the plan design options;

inputting data representative of the subject group responses;

calculating the average perceived benefit for each plan design option;

dividing the cost of providing each option by the calculated average perceived benefit for such option; and

outputting the calculated data.

16. The method of claim 15 wherein each subject's perceived benefit for each plan design option comprises the sum of the product of the relative weight accorded each statistical factor as defined by the subject's responses multiplied by the value of such statistical factor.

17. The method of claim 15 further comprising the step of inputting the identification of a reference plan design option; and wherein the average perceived benefit for each plan design option is determined by comparing values of the statistical factors relating to such plan design option to the values of the statistical factors relating to the reference plan design option

* * * * *

US006229895B1

(12) **United States Patent**
Son et al.

(10) **Patent No.: US 6,229,895 B1**
(45) **Date of Patent: May 8, 2001**

(54) **SECURE DISTRIBUTION OF VIDEO ON-DEMAND**

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(73) Assignee: **DIVA Systems Corp.**, Redwood City, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/267,800**

(22) Filed: **Mar. 12, 1999**

(51) **Int. Cl.**[7] **H04N 7/167**
(52) **U.S. Cl.** **380/200**; 725/31
(58) **Field of Search** 380/200, 211, 380/210; 725/31

(56) **References Cited**

PUBLICATIONS

Minoli, Daniel, *Video Dialtone Technology*, McGraw–Hill, Inc., 1995, pp. 433 & 438–437.*
Wayner, Peter, *Digital Cash: Commerce on the Net*, AP Professional, 1996, pp. 19–23.*

* cited by examiner

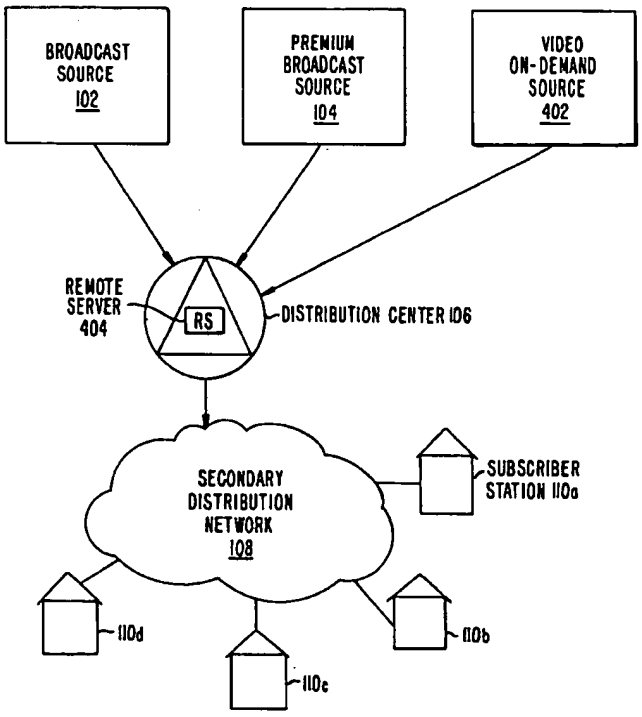
Primary Examiner—Tod Swann
Assistant Examiner—Matthew Smithers

(74) *Attorney, Agent, or Firm*—Thomason, Moser & Patterson, LLP

(57) **ABSTRACT**

In accordance with a first aspect, a remote server receives video programming in a first encrypted form and stores the video programming. After the remote server receives a request from a subscriber station for transmission of the video programming, the remote server decrypts the video programming, re-encrypts the video programming into a second encrypted form, and then transmits the video programming to the subscriber station. In accordance with a second aspect, a remote server receives video programming in a first encrypted form, decrypts the video programming, re-encrypts the video programming into a second encrypted form, and then stores the video programming. After the remote server receives a request from a subscriber station, the remote server simply transmits the video programming. In accordance with a third aspect, a remote server receives video programming in a first encrypted form and stores the video programming. After the remote server receives a request from a subscriber station, the remote server passes through the video content by transmitting the video programming. In accordance with a fourth aspect, a remote server receives pre-encrypted video programming and stores it. After the remote server receives a request from a subscriber station, the remote server completes encryption of the video programming and then transmits the video programming.

34 Claims, 8 Drawing Sheets



Claims 12 & 13

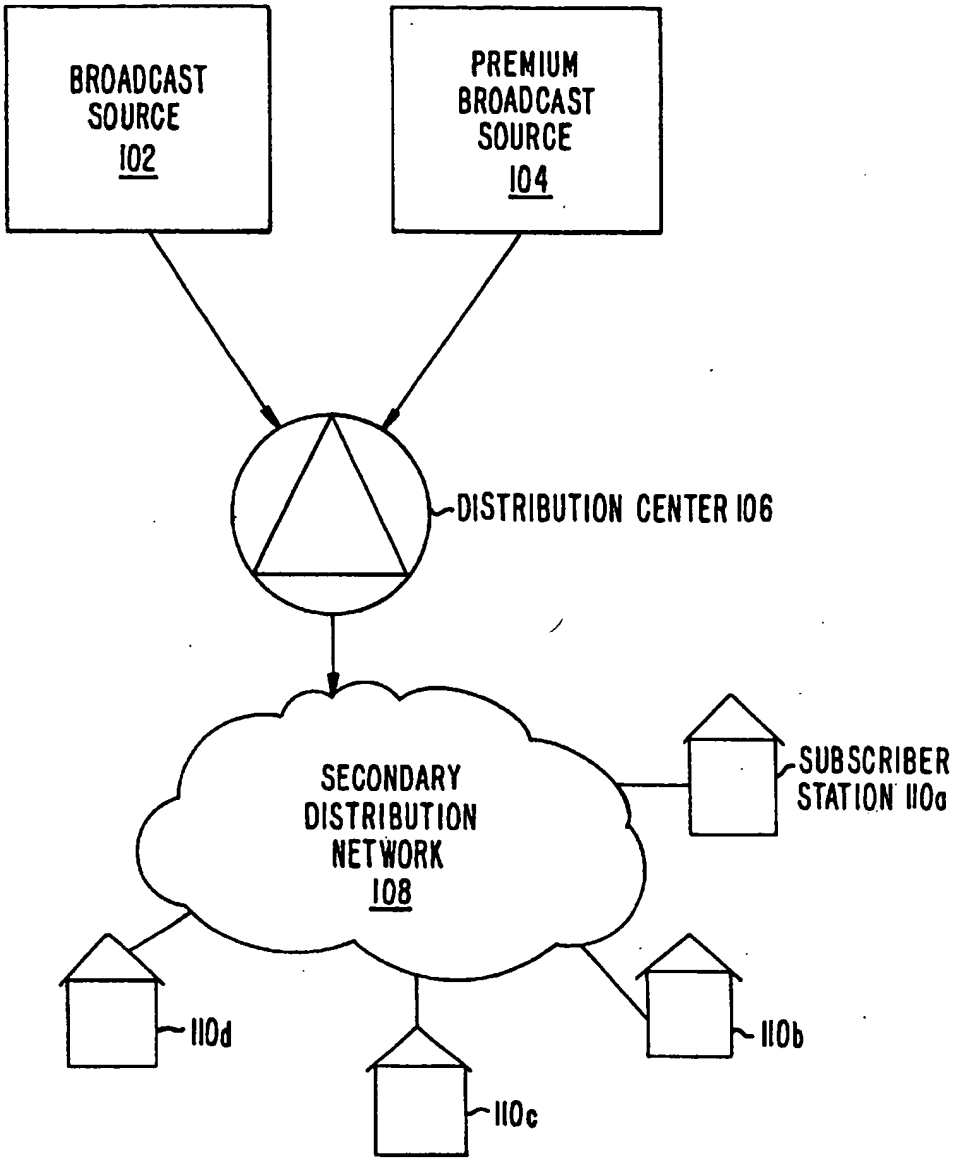


FIG. 1. (PRIOR ART)

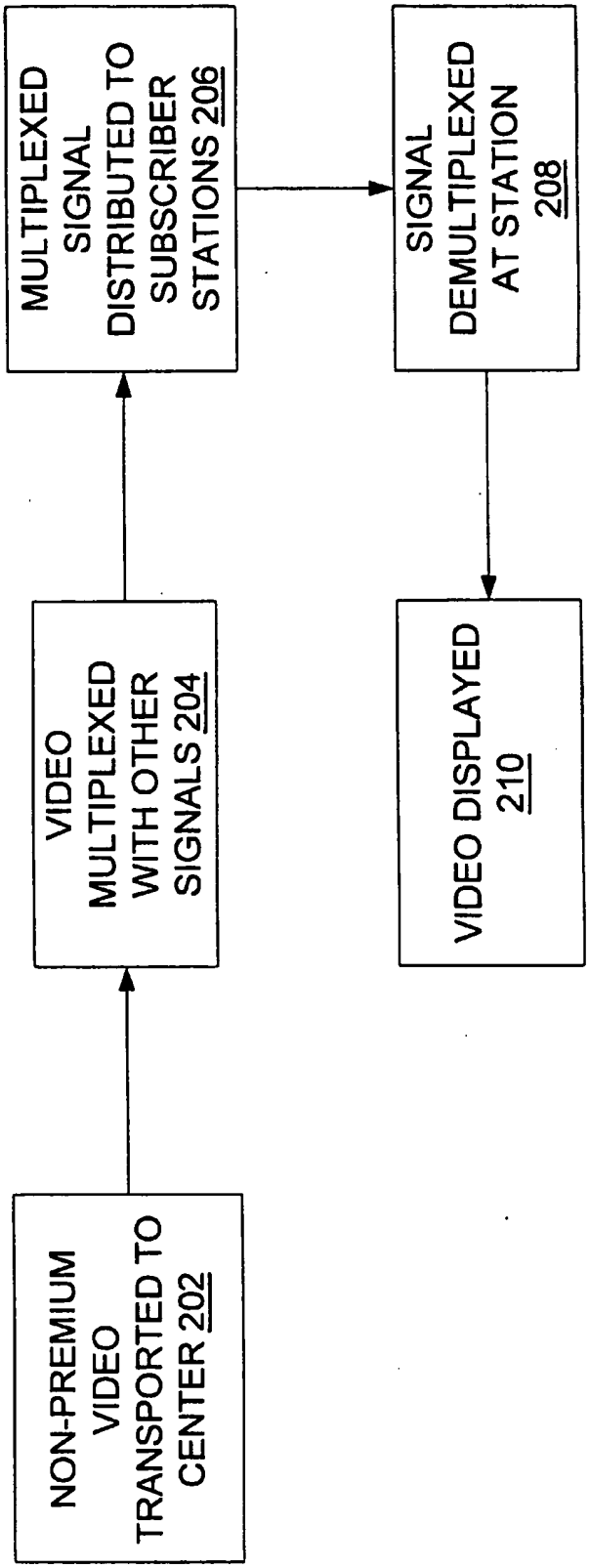


FIG. 2. (PRIOR ART)

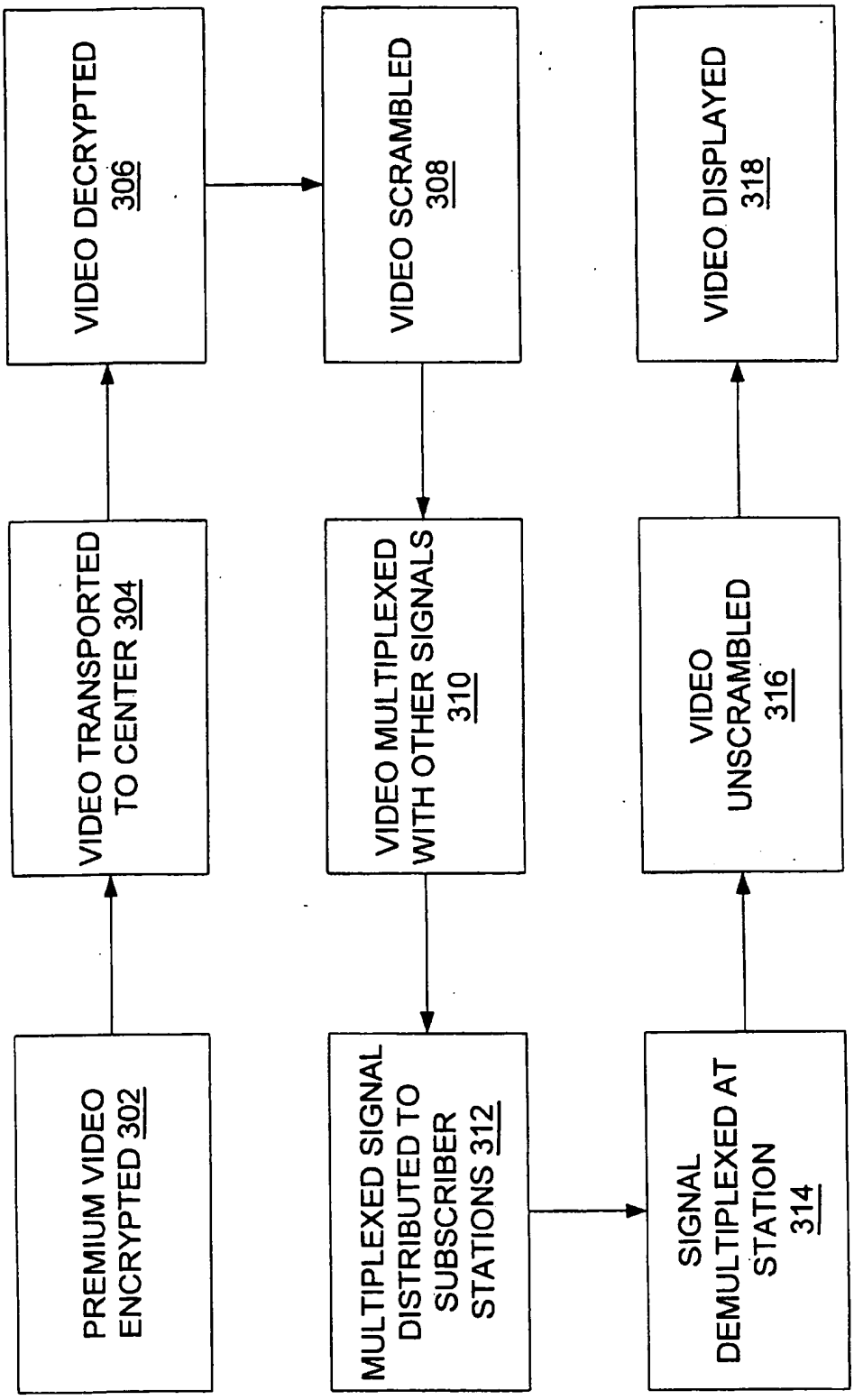


FIG. 3. (PRIOR ART)

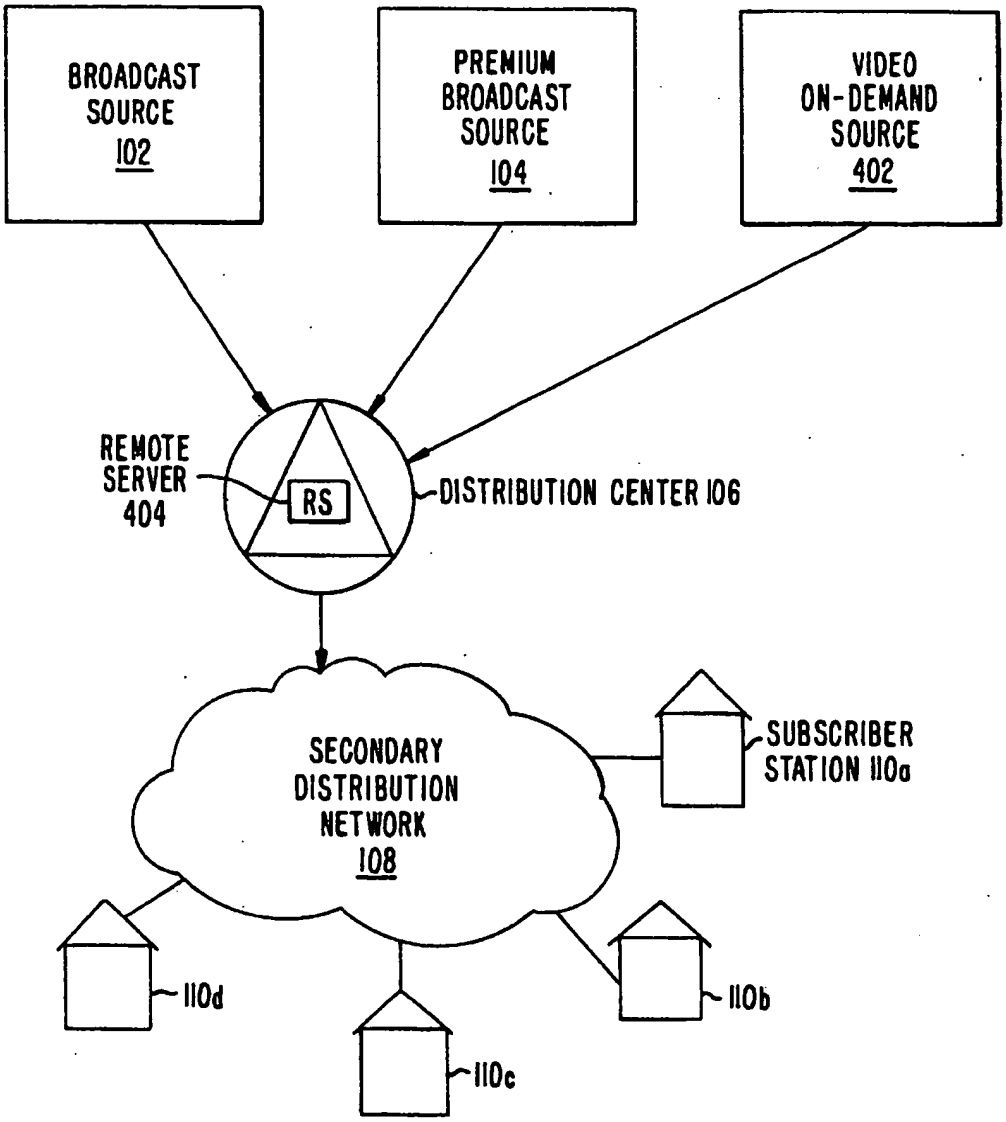

BROADCAST SOURCE 102
PREMIUM BROADCAST SOURCE 104
VIDEO ON-DEMAND SOURCE 402
REMOTE SERVER 404
RS
DISTRIBUTION CENTER 106
SECONDARY DISTRIBUTION NETWORK 108
SUBSCRIBER STATION 110a
110d
110c
110b

FIG. 4.

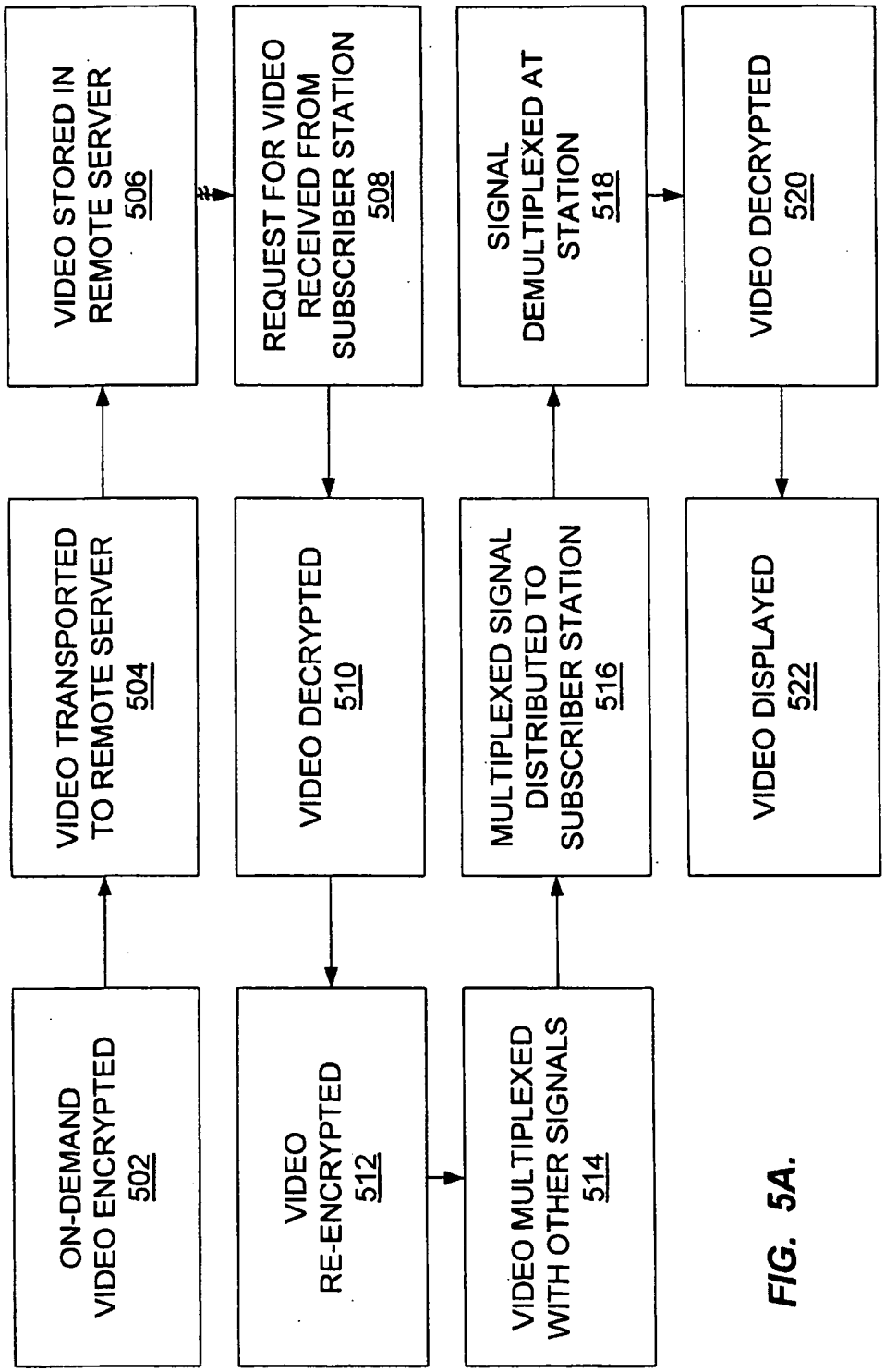

ON-DEMAND VIDEO ENCRYPTED 502
VIDEO TRANSPORTED TO REMOTE SERVER 504
VIDEO STORED IN REMOTE SERVER 506
VIDEO RE-ENCRYPTED 512
VIDEO DECRYPTED 510
REQUEST FOR VIDEO RECEIVED FROM SUBSCRIBER STATION 508
VIDEO MULTIPLEXED WITH OTHER SIGNALS 514
MULTIPLEXED SIGNAL DISTRIBUTED TO SUBSCRIBER STATION 516
SIGNAL DEMULTIPLEXED AT STATION 518
VIDEO DISPLAYED 522
VIDEO DECRYPTED 520

FIG. 5A.

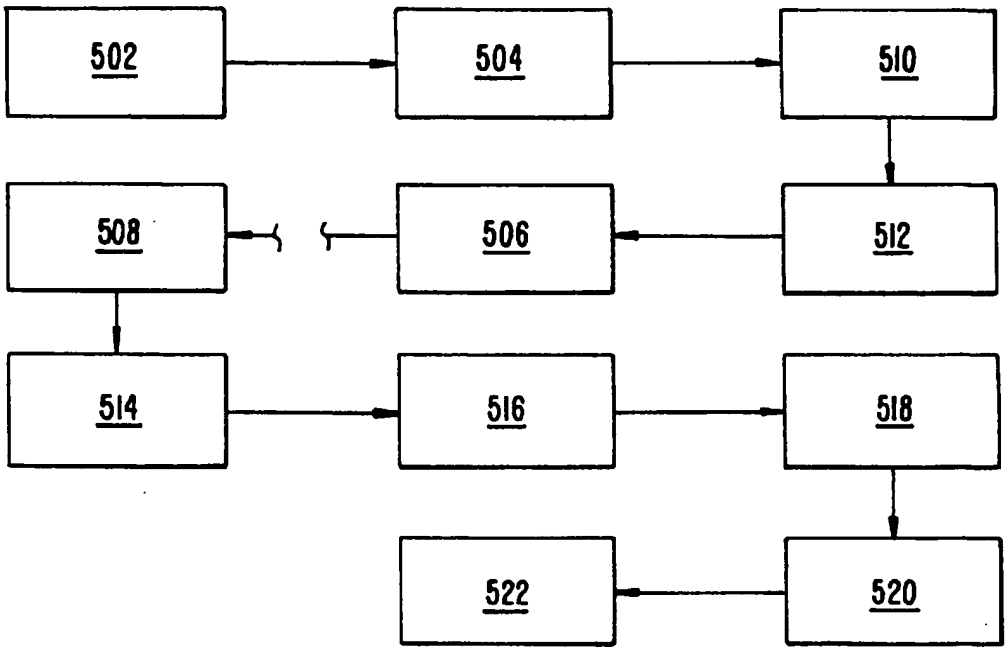


FIG. 5B

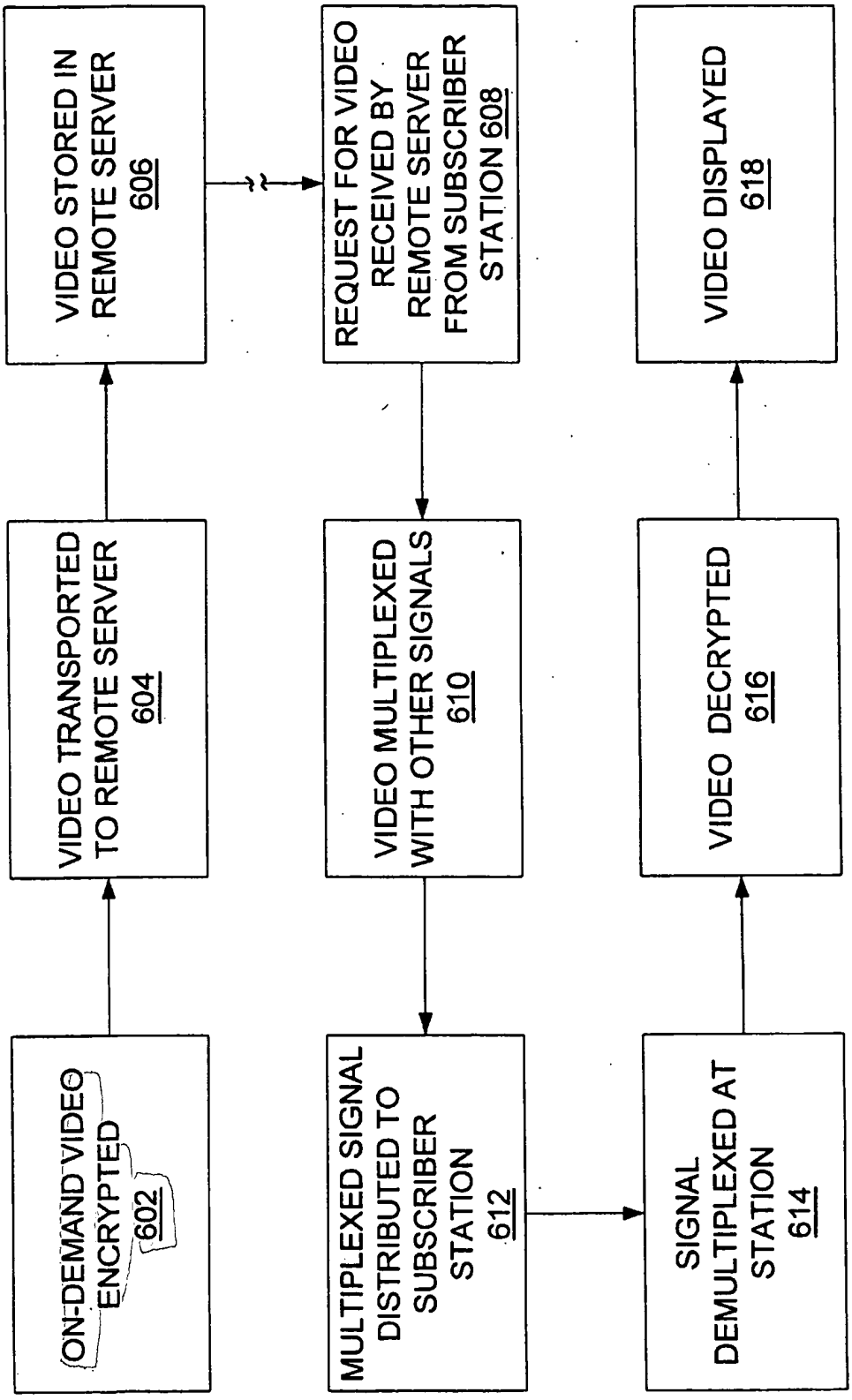

ON-DEMAND VIDEO ENCRYPTED 602
VIDEO TRANSPORTED TO REMOTE SERVER 604
VIDEO STORED IN REMOTE SERVER 606
MULTIPLEXED SIGNAL DISTRIBUTED TO SUBSCRIBER STATION 612
VIDEO MULTIPLEXED WITH OTHER SIGNALS 610
REQUEST FOR VIDEO RECEIVED BY REMOTE SERVER FROM SUBSCRIBER STATION 608
SIGNAL DEMULTIPLEXED AT STATION 614
VIDEO DECRYPTED 616
VIDEO DISPLAYED 618

FIG. 6.

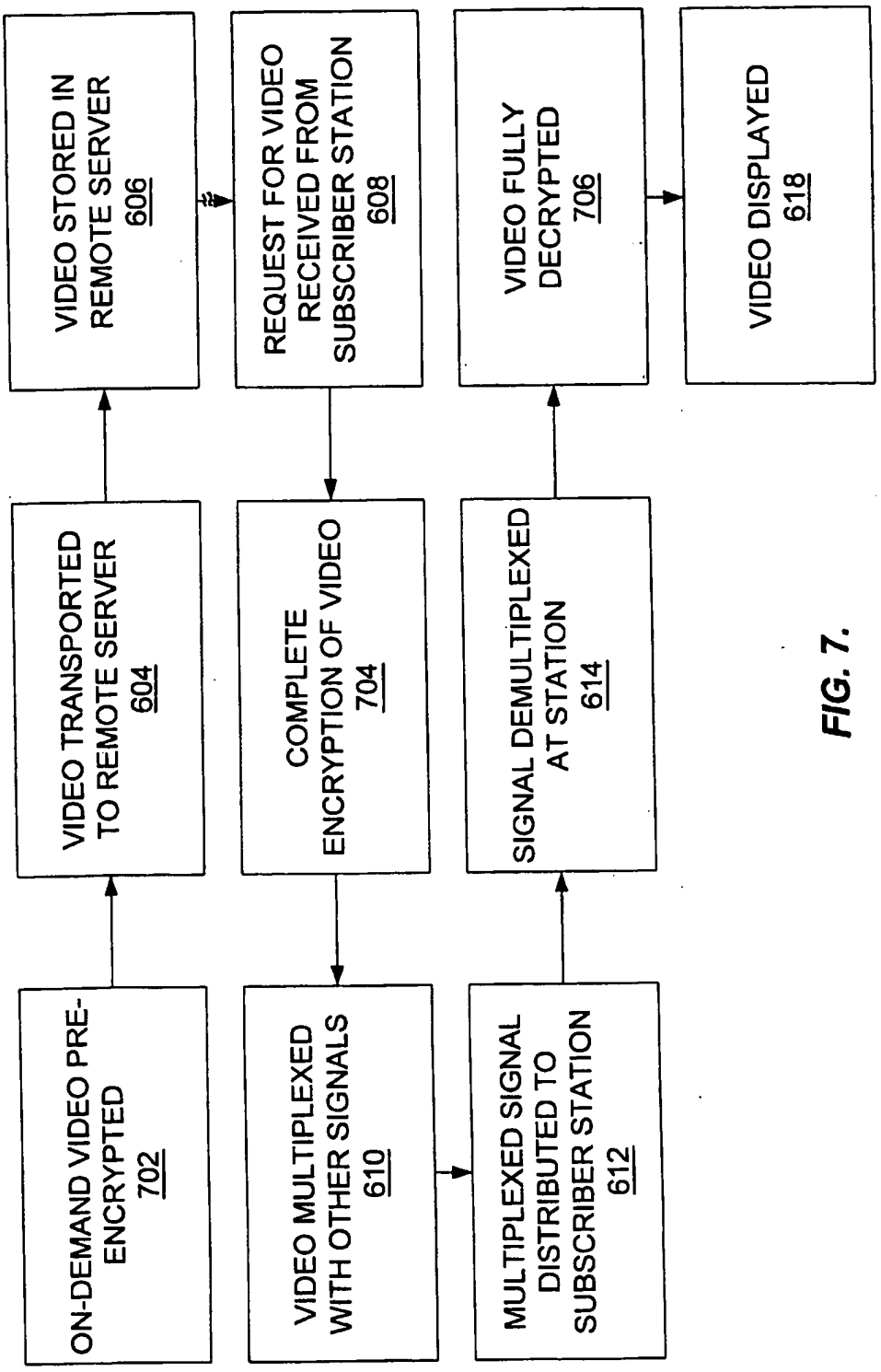

ON-DEMAND VIDEO PRE-ENCRYPTED 702
VIDEO TRANSPORTED TO REMOTE SERVER 604
VIDEO STORED IN REMOTE SERVER 606
VIDEO MULTIPLEXED WITH OTHER SIGNALS 610
COMPLETE ENCRYPTION OF VIDEO 704
REQUEST FOR VIDEO RECEIVED FROM SUBSCRIBER STATION 608
MULTIPLEXED SIGNAL DISTRIBUTED TO SUBSCRIBER STATION 612
SIGNAL DEMULTIPLEXED AT STATION 614
VIDEO FULLY DECRYPTED 706
VIDEO DISPLAYED 618

FIG. 7.

SECURE DISTRIBUTION OF VIDEO ON-DEMAND

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to the field of video distribution networks. In particular, this invention relates to secure video distribution networks.

2. Description of the Background Art

Security is an important issue for video distribution networks. For cable distribution networks, there are various portions or locations where security is of concern.

A first portion where security is of concern is the primary distribution network. The primary distribution network is where video content is transferred from television studios to distribution centers. A second portion where security is of concern is the secondary distribution network. The secondary distribution network is where the video content is transmitted from a distribution center to subscriber stations.

For video on-demand distribution networks, there is an additional point where security is of concern. That point is a remote server within a distribution center. Typically, such a remote server stores the video content before the video content is distributed to the subscriber stations.

SUMMARY OF THE INVENTION

The present invention provides a solution to the security issues presented above, especially with regards to security at a remote server. In accordance with a first aspect of the invention, a remote server receives video programming in a first encrypted form and stores the video programming in the first encrypted form. After the remote server receives a request from a subscriber station for transmission of the video programming, the remote server decrypts the video programming, re-encrypts the video programming into a second encrypted form, and then transmits the video programming in the second encrypted form to the subscriber station.

In accordance with a second aspect of the invention, a remote server receives video programming in a first encrypted form, decrypts the video programming, re-encrypts the video programming into a second encrypted form, and then stores the video programming in the second encrypted form. After the remote server receives a request from a subscriber station for transmission of the video programming, the remote server simply transmits the video programming in the second encrypted form to the subscriber station.

In accordance with a third aspect of the invention, a remote server receives video programming in a first encrypted form and stores the video programming in the first encrypted form. After the remote server receives a request from a subscriber station for transmission of the video programming, the remote server passes through the video content by transmitting the video programming in the first encrypted form to the subscriber station.

In accordance with a fourth aspect of the invention, a remote server receives pre-encrypted video programming and stores the pre-encrypted video programming. After the remote server receives a request from a subscriber station for transmission of the video programming, the remote server completes encryption of the video programming and then transmits the video programming to the subscriber station. At the subscriber station, the video programming is fully decrypted.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic diagram of a conventional cable distribution network.

FIG. **2** is a flow chart depicting a conventional insecure process for distributing video content via a conventional cable distribution network.

FIG. **3** is a flow chart depicting a conventional (somewhat) secure process for distributing video content via a conventional cable distribution network.

FIG. **4** is a schematic diagram of a cable distribution network including a video on-demand source in accordance with a preferred embodiment of the present invention.

FIG. **5A** is a flow chart depicting a secure process for distributing video on-demand content via a cable distribution network in accordance with a first aspect of the present invention.

FIG. **5B** is a flow chart depicting a secure process for distributing video on-demand content via a cable distribution network in accordance with a second aspect of the present invention.

FIG. **6** is a flow chart depicting a secure process for distributing video on-demand content via a cable distribution network in accordance with a third aspect of the present invention.

FIG. **7** is a flow chart depicting a secure process for distributing video on-demand content via a cable distribution network in accordance with a fourth aspect of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** is a schematic diagram of a conventional cable distribution network. The conventional cable distribution network typically includes one or more broadcast sources **102**, one or more premium broadcast sources **104**, one or more distribution centers **106**, one or more secondary distribution networks **108**, and a plurality of subscriber stations **110**.

The broadcast source **102** may be, for example, a local television station. For instance, an affiliate station of a major network such as ABC, NBC, CBS, FOX, or UPN. The premium broadcast source **104** may be, for example, a premium channel such as HBO, Showtime, Cinemax, and so on. The sources **102** and **104** may be coupled via a primary distribution network to the distribution center **106**. The distribution center **106** may be, for example, a cable head-end. The distribution center **106** may be coupled via a secondary distribution network **108** to the subscriber stations **110**. The secondary distribution network **108** comprises may include, for example, various amplifiers, bridges, taps, and drop cables. Finally, the subscriber stations **110** may be, for example, set-top boxes and associated television equipment for viewing the video content by end users.

FIG. **2** is a flow chart depicting a conventional insecure process for distributing video content via a conventional cable distribution network. First, a non-premium video signal is transported **202** from the broadcast source **102** to the distribution center **106**. At the distribution center **106**, the video signal is multiplexed **204** with other signals to generate a multiplexed signal. The multiplexed signal is then distributed **206** from the distribution center **106** via the secondary distribution network **108** to the subscriber stations **110**. At the subscriber stations **110**, the multiplexed signal is demultiplexed **208** to isolate the video signal, and then the video signal is displayed **210**, typically, on a television monitor.

FIG. 3 is a flow chart depicting a conventional (somewhat) secure process for distributing video content via a conventional cable distribution network. First, a premium video signal is encrypted **302** to generate an encrypted signal. The encrypted signal is transported **304** from the premium broadcast source **104** to the distribution center **106**.

At the distribution center **106**, the video signal is decrypted **306** to regenerate the premium video signal. The premium video signal is then scrambled **308** and multiplexed **310** with other signals to generate a multiplexed signal. The multiplexed signal is then distributed **312** from the distribution center **106** via the secondary distribution network **108** to the subscriber stations **110**.

At the subscriber stations **110**, the multiplexed signal is demultiplexed **314** to isolate the scrambled video signal, the scrambled video signal is unscrambled **316**, and then the video signal is displayed **318**, typically, on a television monitor connected to a set-top box. The process in FIG. **3** is a typical conventional process for delivering premium video using scrambling. Other conventional processes also exist.

FIG. **4** is a schematic diagram of a cable distribution network including a video on-demand source in accordance with a preferred embodiment of the present invention. In addition to the components of the conventional cable distribution network shown in FIG. **1**, the cable distribution network shown in FIG. **4** includes a video on-demand source **402** and a remote server **404**. The video on-demand source **402** may house, for example, a collection of video programs such as, for example, movies. As shown in FIG. **4**, the remote server **404** may be located within the distribution center **106**. The remote server **404** may include, for example, a parallel processing computer configured to be a video server, a disk drive array to store video data, and a video session manager to provide session control of the video data flowing to and from the video server.

FIG. **5A** is a flow chart depicting a secure process for distributing video on-demand content via a cable distribution network in accordance with a first aspect of the present invention. The process depicted in FIG. **5A** may be called a store, decrypt, and re-encrypt process.

First, a video program is encrypted **502** by a video on-demand source **402** to generate an encrypted program in a first encrypted form. The encrypted program is transported **504** via a primary distribution network from the video on-demand source **402** to a remote server **404** within a distribution center **106**. The encrypted program is then stored **506** in the remote server **404**.

Subsequently, when the remote server **404** receives **508** a request for transmission of the video program from a subscriber station **110**, the remote server **404** responds by first decrypting **510** the video program from the first encrypted form. A first key is may be used to accomplish such decryption **510**, and such key may have been received from the video on-demand source **402** via a communication channel that is separate from the one used to transmit the video program. After the video program is decrypted **510**, the remote server **404** re-encrypts **512** the video program into a second encrypted form using a second key.

The second key may be a public key of a public key encryption system. Such a public key encryption system uses two different key: a public key to encrypt data and a private key to decrypt data. In that case, decryption would be accomplished using a corresponding private key of the public key encryption system. Examples of such a public key encryption system is encryption under the PGP (Pretty Good Privacy) system or under the RSA (Rivest, Shamir, and Adleman) system. Alternatively, the second key may be a private key of a private key encryption system. Such a private key encryption system uses a single private key to encrypt and decrypt data. Examples of such a private key encryption system is encryption under the Data Encryption Standard (DES) or under triple-DES which involves applying DES three times to enhance security. The private key(s) itself may be transmitted from the remote server **404** to the subscriber station **110** while encrypted in a third encrypted form.

After the video program is re-encrypted **512**, the re-encrypted program in the second encrypted form (and the second key if necessary) is multiplexed **514** with other signals to generate a multiplexed signal. The multiplexed signal is then distributed **516** via the secondary distribution network **108** to the subscriber stations **110**.

At the subscriber stations **110**, the multiplexed signal is demultiplexed **518** to isolate the re-encrypted program in the second encrypted form (and the second key if necessary), the re-encrypted program is decrypted **520** from the second encrypted form to generate the unencrypted video program, and then the video program is displayed **522**, typically, on a television monitor connected to set-top box.

FIG. **5B** is a flow chart depicting a secure process for distributing video on-demand content via a cable distribution network in accordance with a second aspect of the present invention. The process depicted in FIG. **5B** may be called a decrypt, re-encrypt, and store process. In comparison with the process in FIG. **5A**, the process in FIG. **5B** decrypts **510** and re-encrypts **512** the video program before the video program is stored **506** in the remote server **404**.

First, a video program is encrypted **502** by a video on-demand source **402** to generate an encrypted program in a first encrypted form. The encrypted program is transported **504** via a primary distribution network from the video on-demand source **402** to a remote server **404** within a distribution center **106**. At this point, the remote server **510** decrypts **510** the video program from the first encrypted form. A first key may be used to accomplish such decryption **510**, and such key may have been received from the video on-demand source **402** via a communication channel that is separate from the one used to transmit the video program. After the video program is decrypted **510**, the remote server **404** re-encrypts **512** the video program into a second encrypted form using a second key. After the decryption **510** and re-encryption **510**, the re-encrypted program is then stored **506** in the remote server **404**.

Note that step **506** in FIG. **5B** differs from step **506** in FIG. **5A**, in that step **506** in FIG. **5B** involves storing the video program in the second encrypted form, while step **506** in FIG. **5A** involves storing the video program in the first encrypted form.

Subsequently, when the remote server **404** receives **508** a request for transmission of the video program from a subscriber station **110**, the remote server **404** responds by multiplexing **514** the re-encrypted program in the second encrypted form (and the second key if necessary) with other signals to generate a multiplexed signal. The multiplexed signal is then distributed **516** via the secondary distribution network **108** to the requesting subscriber station **110**.

At the subscriber stations **110**, the multiplexed signal is demultiplexed **518** to isolate the re-encrypted program in the second encrypted form (and the second key if necessary), the re-encrypted program is decrypted **520** from the second encrypted form to generate the unencrypted video program, and then the video program is displayed **522**, typically, on a television monitor connected to set-top box.

FIG. 6 is a flow chart depicting a secure process for distributing video on-demand content via a cable distribution network in accordance with a third aspect of the present invention. The process depicted in FIG. 6 may be called a pass-through process.

First, a video program is encrypted 602 by a video on-demand source 402 to generate an encrypted program in a first encrypted form. The encrypted program is transported 604 via a primary distribution network from the video on-demand source 402 to a remote server 404 within a distribution center 106. A key to decrypt the encrypted program may also be transported from the source 402 to the server 404. The encrypted program is then stored 606 in the remote server 404.

The key may be a public key of a public key encryption system. Such a public key encryption system uses two different key: a public key to encrypt data and a private key to decrypt data. In that case, decryption would be accomplished using a corresponding private key of the public key encryption system. Examples of such a public key encryption system is encryption under the PGP (Pretty Good Privacy) system or under the RSA (Rivest, Shamir, and Adleman) system. Alternatively, the key may be a private key of a private key encryption system. Such a private key encryption system uses a single private key to encrypt and decrypt data. Examples of such a private key encryption system is encryption under the Data Encryption Standard (DES) or under triple-DES which involves applying DES three times to enhance security. The private key(s) itself may be transmitted from the source 402 to the server 404 while encrypted in a second encrypted form. Alternatively, the private key(s) may be transported from the source 402 to the server 404 via a communication channel which is separate from the communication channel used to transport the video program from the source 402 to the server 404.

Subsequently, when the remote server 404 receives 608 a request for transmission of the video program from a subscriber station 110, the remote server 404 responds by multiplexing 610 the encrypted program in the first encrypted form (and the key if necessary) with other signals to generate a multiplexed signal. The multiplexed signal is then distributed 612 via the secondary distribution network 108 to the requesting subscriber station 110.

At the subscriber stations 110, the multiplexed signal is demultiplexed 614 to isolate the encrypted program in the first encrypted form (and the key if necessary), the encrypted program is decrypted 616 from the first encrypted form to generate the unencrypted video program, and then the video program is displayed 618, typically, on a television monitor connected to set-top box.

FIG. 7 is a flow chart depicting a secure process for distributing video on-demand content via a cable distribution network in accordance with a fourth aspect of the present invention. The process depicted in FIG. 7 may be called a multiple-layer encryption process. In comparison with the process in FIG. 6, the process in FIG. 7 pre-encrypts 702 the video program at the source 402, completes encryption 704 of the video program at the remote server 404, and fully decrypts 706 the video program at the subscriber station 110.

The pre-encryption step 702 may be implemented by applying a single DES encryption or a double DES encryption. If the pre-encryption step 702 uses a single DES encryption, then the completion of encryption step 704 may be implemented by applying a double DES encryption to achieve triple-DES encryption. Similarly, if the pre-encryption step 702 uses a double DES encryption, then the completion of encryption step 704 may be implemented by applying a single DES encryption to achieve triple-DES encryption. In either case, the video program is transported from the remote server 404 to the subscriber station 110 while under triple-DES encryption. As long as the subscriber station has the three keys required, it will be able to fully decrypt 706 the triple-DES encryption to obtain the unencrypted video program.

It is to be understood that the specific mechanisms and techniques which have been described are merely illustrative of one application of the principles of the invention. For example, while the present invention is described in application to video on-demand, it also has some application in broadcast video. Numerous additional modifications may be made to the methods and apparatus described without departing from the true spirit of the invention.

What is claimed is:

1. A secure method performed by a remote server for providing video programming requested by at least a first of a plurality of subscriber stations, the method comprising:
   - receiving the video programming in a first encrypted form from a programming source;
   - storing the video programming in the first encrypted form;
   - receiving a request from a subscriber station for transmission of the video programming;
   - decrypting the video programming from the first encrypted form;
   - re-encrypting the video programming into a second encrypted form; and
   - causing transmission of the video programming in the second encrypted form to the subscriber station.

2. The method as set forth in claim 1, wherein the video programming in the second encrypted form is to be decrypted from the second encrypted form using a key.

3. The method as set forth in claim 2, wherein the second encrypted form comprises a form of public-key encryption, and the key comprises a private key to decrypt the public-key encryption.

4. The method as set forth in claim 2, wherein the key is transmitted to the subscriber station in a third encrypted form such that the subscriber station must decrypt the key before decrypting the video programming.

5. The method as set forth in claim 2, wherein the second encrypted form includes encryption utilizing a Data Encryption Standard.

6. The method as set forth in claim 1, wherein a key is used to decrypt the video programming from the first encrypted form, and wherein the video programming in the first encrypted form and the key are received from the programming source via separate communication channels.

7. The method as set forth in claim 1, wherein causing transmission of the video programming in the second encrypted form to the subscriber station includes multiplexing the video programming in the second encrypted form with other signals to create a multiplexed signal and causing transmission of the multiplexed signal to the subscriber station.

8. The method as set forth in claim 1, wherein the remote server comprises a remote video on-demand server.

9. The method as set forth in claim 1, wherein the remote server is located within a head-end, and the transmission to the subscriber station occurs via a secondary distribution network.

10. The method as set forth in claim 1, wherein the receiving from the programming source occurs via a primary distribution network.

11. A secure method performed by a remote server for providing video programming requested by at least a first of a plurality of subscriber stations, the method comprising:

receiving the video programming in a first encrypted form from a programming source;

decrypting the video programming from the first encrypted form;

re-encrypting the video programming in a second encrypted form;

storing the video programming in the second encrypted form;

receiving a request from a subscriber station for transmission of the video programming; and

causing transmission of the video programming into the second encrypted form to the subscriber station.

12. The method as set forth in claim 11, wherein the video programming in the second encrypted form is to be decrypted from the second encrypted form using a key.

13. The method as set forth in claim 12, wherein the second encrypted form comprises a form of public-key encryption, and the key comprises a private key to decrypt the public-key encryption.

14. The method as set forth in claim 12, wherein the key is transmitted to the subscriber station in a third encrypted form such that the subscriber station must decrypt the key before decrypting the video programming.

15. The method as set forth in claim 12, wherein the second encrypted form includes encryption utilizing a Data Encryption Standard.

16. The method as set forth in claim 11, wherein a key is used to decrypt the video programming from the first encrypted form, and wherein the video programming in the first encrypted form and the key are received from the programming source via separate communication channels.

17. The method as set forth in claim 11, wherein causing transmission of the video programming in the second encrypted form to the subscriber station includes multiplexing the video programming in the second encrypted form with other signals to create a multiplexed signal and causing transmission of the multiplexed signal to the subscriber station.

18. The method as set forth in claim 11, wherein the remote server comprises a remote video on-demand server.

19. The method as set forth in claim 11, wherein the remote server is located within a head-end, and the transmission to the subscriber station occurs via a secondary distribution network.

20. The method as set forth in claim 11, wherein the receiving from the programming source occurs via a primary distribution network.

21. A secure method performed by a remote server for providing video programming requested by at least a first of a plurality of subscriber stations, the method comprising:

receiving the video programming in a first encrypted form from a programming source;

storing the video programming in the first encrypted form;

receiving a request from a subscriber station for transmission of the video programming; and

responding to the request by causing transmission of the video programming in the first encrypted form to the subscriber station.

22. The method as set forth in claim 21, wherein the video programming in the first encrypted form is to be decrypted from the first encrypted form using a key.

23. The method as set forth in claim 22, wherein the first encrypted form comprises a form of public-key encryption, and the key comprises a private key to decrypt the public-key encryption.

24. The method as set forth in claim 22, wherein the key is transmitted to the subscriber station in a second encrypted form such that the subscriber station must decrypt the key before decrypting the video programming.

25. The method as set forth in claim 22, wherein the first encrypted form includes encryption utilizing a Data Encryption Standard.

26. The method as set forth in claim 21, wherein a key is used to decrypt the video programming from the first encrypted form, and wherein the video programming in the first encrypted form and the key are received from the programming source via separate communication channels.

27. The method as set forth in claim 21, wherein causing transmission of the video programming in the first encrypted form to the subscriber station includes multiplexing the video programming in the first encrypted form with other signals to create a multiplexed signal and causing transmission of the multiplexed signal to the subscriber station.

28. The method as set forth in claim 21, wherein the remote server comprises a remote video on-demand server.

29. The method as set forth in claim 21, wherein the remote server is located within a head-end, and the transmission from the remote server to the subscriber station occurs via a secondary distribution network.

30. The method as set forth in claim 21, wherein the receiving from the programming source occurs via a primary distribution network.

31. A secure method performed by a remote server for providing video programming requested by at least a first of a plurality of subscriber stations, the method comprising:

receiving the video programming in a pre-encrypted form from a programming source;

storing the video programming in the pre-encrypted form;

receiving a request from a subscriber station for transmission of the video programming;

completing encryption of the video programming to a fully encrypted form; and

causing transmission of the video programming in the fully encrypted form to the subscriber station.

32. The method as set forth in claim 31, wherein the fully encrypted form comprises a triple-DES encrypted form.

33. The method as set forth in claim 32, wherein the pre-encrypted form comprises a single-DES encrypted form.

34. The method as set forth in claim 32, wherein the pre-encrypted form comprises a double-DES encrypted form.

* * * * *

US006381744B2

(12) **United States Patent**
Nanos et al.

(10) **Patent No.: US 6,381,744 B2**
(45) **Date of Patent: Apr. 30, 2002**

(54) **AUTOMATED SURVEY KIOSK**

(75) Inventors: **Nikita J. Nanos**, Ottawa; **John J. Nanos**, Whitby, both of (CA)

(73) Assignee: **SES Canada Research Inc.**, Toronto (CA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/225,561**

(22) Filed: **Jan. 5, 1999**

(30) **Foreign Application Priority Data**

Jan. 6, 1998 (CA) 2223597

(51) **Int. Cl.**[7] **H04N 7/173**
(52) **U.S. Cl.** **725/24**; 705/27
(58) **Field of Search** 345/327, 328; 455/4.2; 348/6, 7, 12, 13, 552; 705/26, 27; 725/24, 23

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,355,372	A	10/1982	Johnson et al.	364/900
4,958,284	A	9/1990	Bishop et al.	364/419
5,198,642	A	3/1993	Deniger	235/375

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

WO	9735441	9/1997

OTHER PUBLICATIONS

Pitkow J et al "Results from the First World–Wide Web user survey", Computer Networks and ISDN Systems, vol. 27, No. 2, Nov. 1, 1994 (Nov. 01, 1994), p. 243–254.

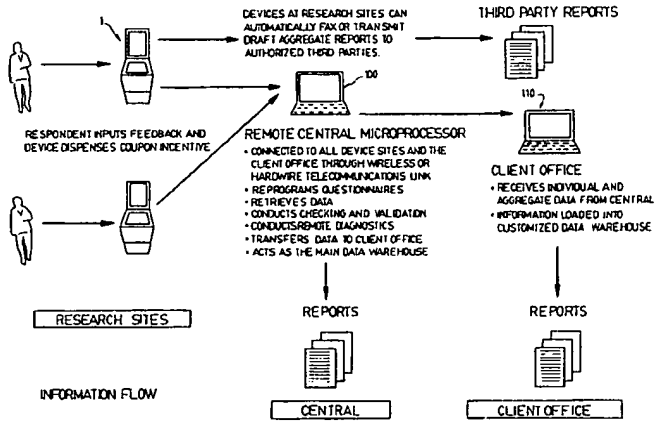
Swoboda W J et al "Internet Surveys by Direct Mailing : an Innovative Way of Collecting Data", Social Science Computer Review, vol. 15, No. 3, 1997, pp. 242–255.

Primary Examiner—Victor R. Kostak
(74) *Attorney, Agent, or Firm*—Merchant & Gould P.C.

(57) **ABSTRACT**

An automated survey kiosk which is easy to install at a location, does not require access to standard telephone lines, can be easily reprogrammed, has unlimited language capabilities, which permits open-ended answers to inquiries or questions and whose survey responses can be sent directly to a client. The automated survey kiosk for administering a survey includes a touch screen for displaying the survey and for receiving survey responses, the touch screen being operatively connected to a general purpose computer for storing the survey, the general computer including a memory for storing the survey responses, operatively connected to the touch screen; and a wireless modem for transmitting the survey responses at a remote location at predetermined intervals. The automated survey kiosk is programmed to prompt a user for a desired language and then administer the survey in the chosen language. The automated survey kiosk may be remotely reprogrammed with new questions, by altering existing questions or by deleting existing questions, from the location of the research firm, even while a respondent is answering the survey. The survey responses may be transmitted to the research firm, or may be directly sent to the client, who must be equipped with the proper equipment to communicate with the automated survey kiosk. Accordingly, the client can have almost instantaneous access to the latest survey data, and can modify the survey during the survey period. The kiosk is also provided with a microphone in order to permit a respondent to record a verbal answer should the multiple choices offered not adequately described the respondent's answer.

8 Claims, 8 Drawing Sheets



claim 9
claim 10

U.S. PATENT DOCUMENTS

5,237,157	A		8/1993	Kaplan 235/375
5,355,327	A		10/1994	Stent et al. 364/551.01
5,361,200	A		11/1994	Weybright et al. 364/401
5,513,117	A	*	4/1996	Small 364/479
5,535,118	A		7/1996	Chumbley ..... 364/401 R
5,594,471	A		1/1997	Deeran 345/173
5,765,142	A	*	6/1998	Allred et al. 705/26
5,867,821	A	*	2/1999	Ballantyne et al. 705/2
5,930,810	A	*	7/1999	Farros et al. 707/506
5,954,690	A	*	9/1999	Szabo 600/300
5,983,200	A	*	11/1999	Slotznick 705/26
6,016,476	A	*	1/2000	Maes et al. 705/1
6,020,883	A	*	2/2000	Herz et al. 345/327
6,024,641	A	*	2/2000	Sarno 463/17
6,026,387	A	*	2/2000	Kesel 706/52
6,061,646	A	*	5/2000	Martino et al. 704/3
6,092,080	A	*	7/2000	Gustman 707/103
6,154,214	A	*	11/2000	Uyehara et al. 345/358

* cited by examiner

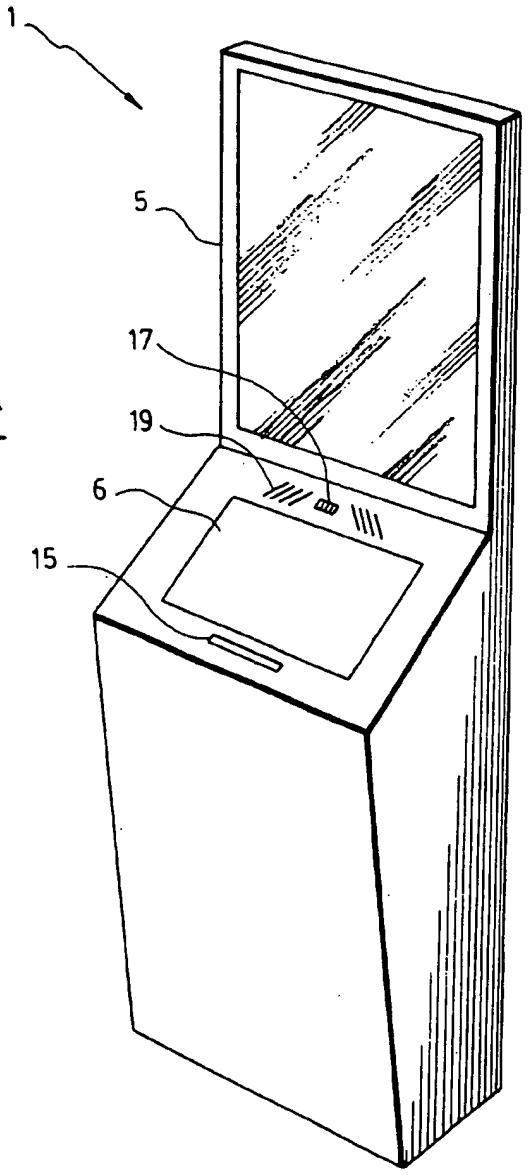


FIG. 1a

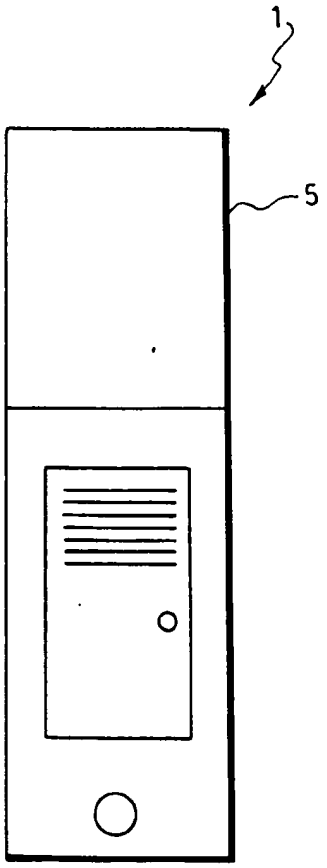


FIG. 1b

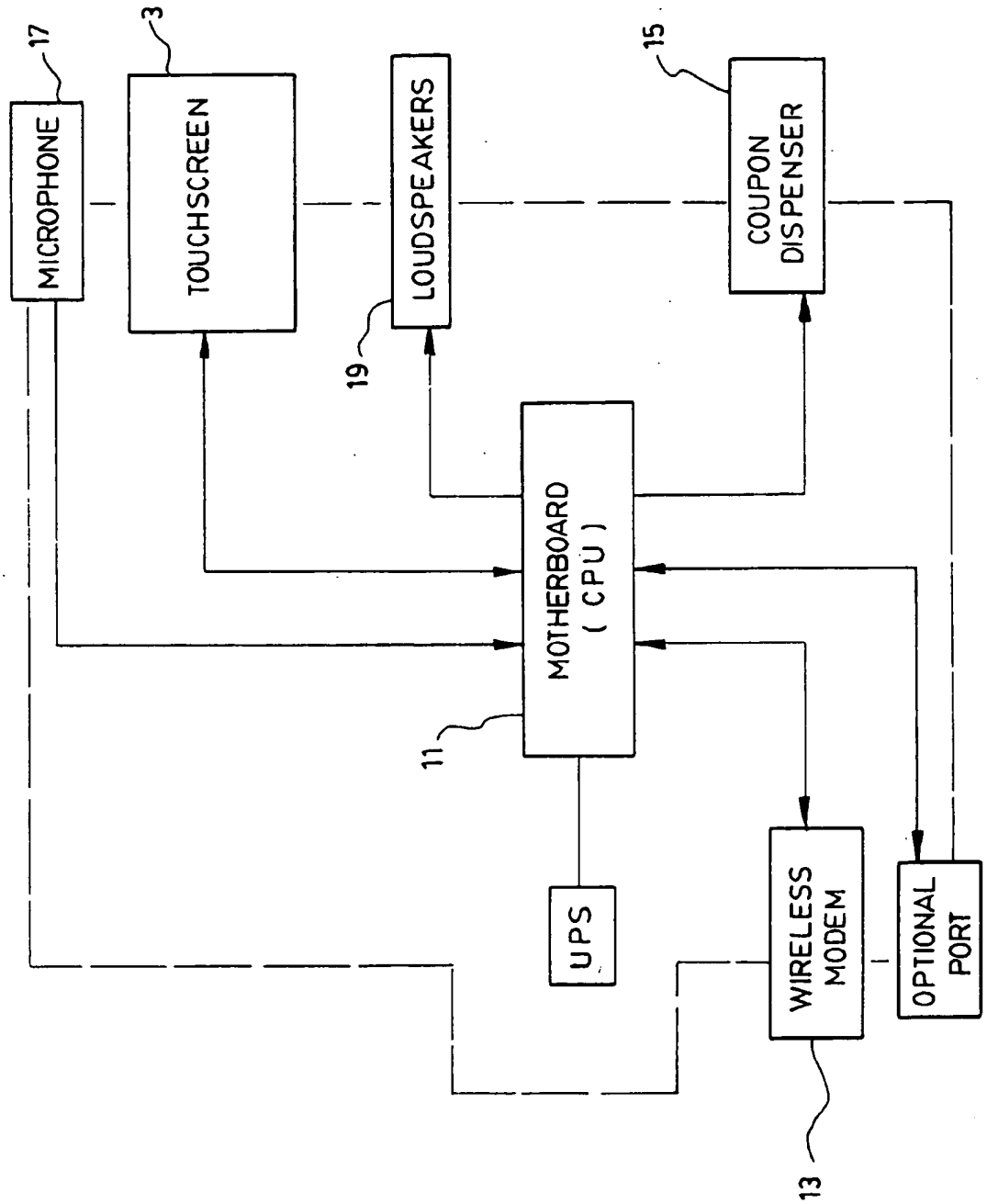

MICROPHONE
17
TOUCHSCREEN
3
LOUDSPEAKERS
19
COUPON DISPENSER
15
MOTHERBOARD (CPU)
11
UPS
WIRELESS MODEM
13
OPTIONAL PORT

FIG. 2

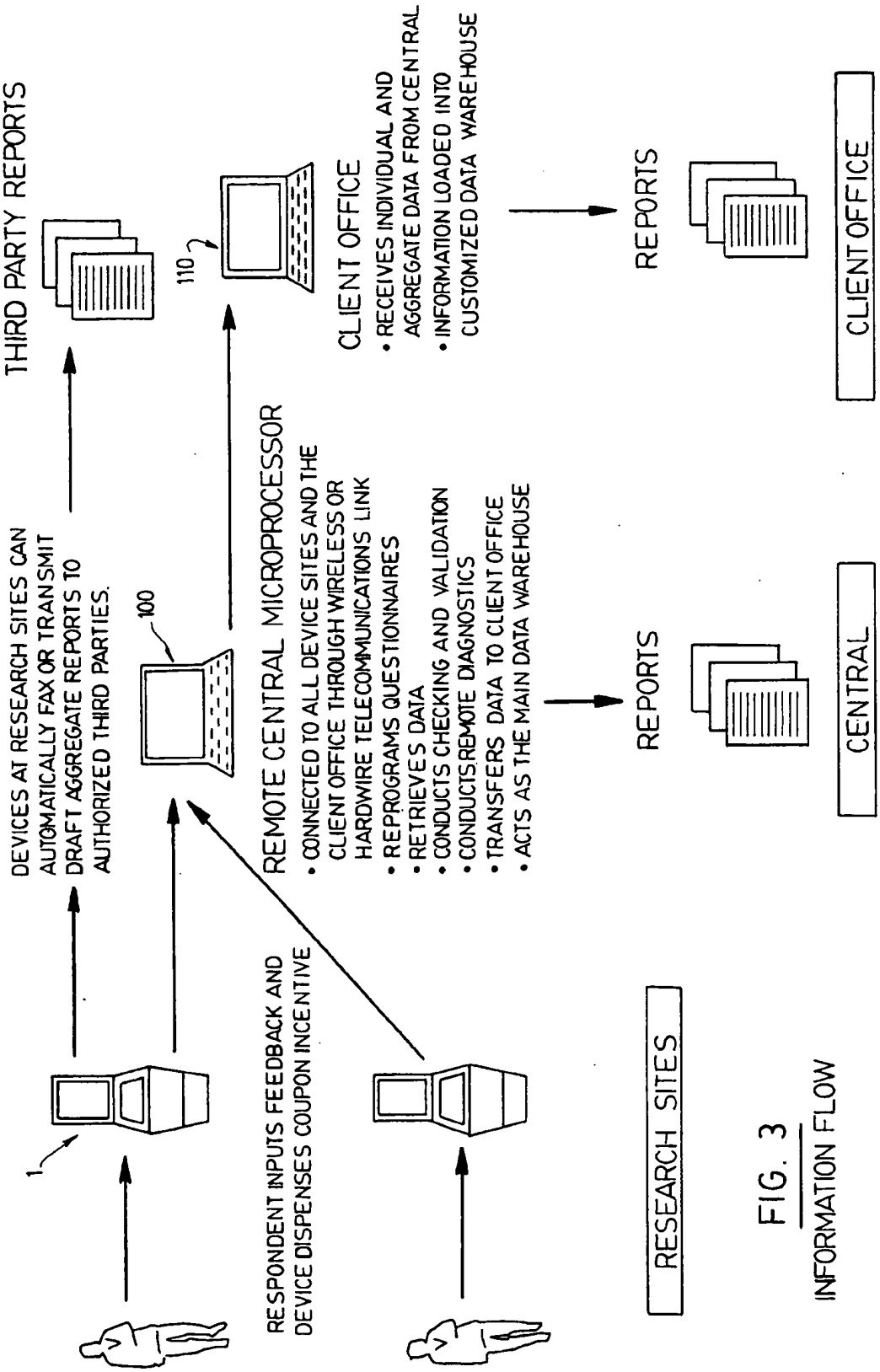


FIG. 3
INFORMATION FLOW

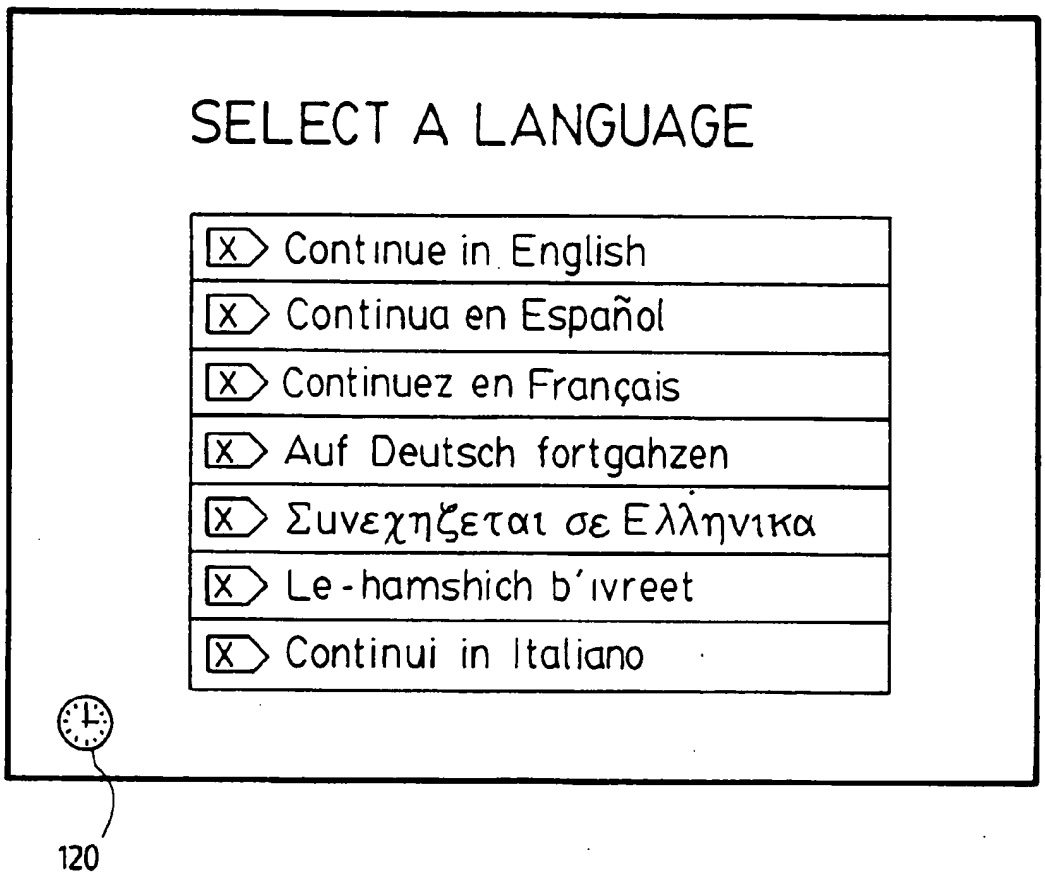

SELECT A LANGUAGE
X Continue in English
X Continua en Español
X Continuez en Français
X Auf Deutsch fortgahzen
X Συνεχηζεται σε Ελληνικα
X Le-hamshich b'ivreet
X Continui in Italiano
120

FIG. 4

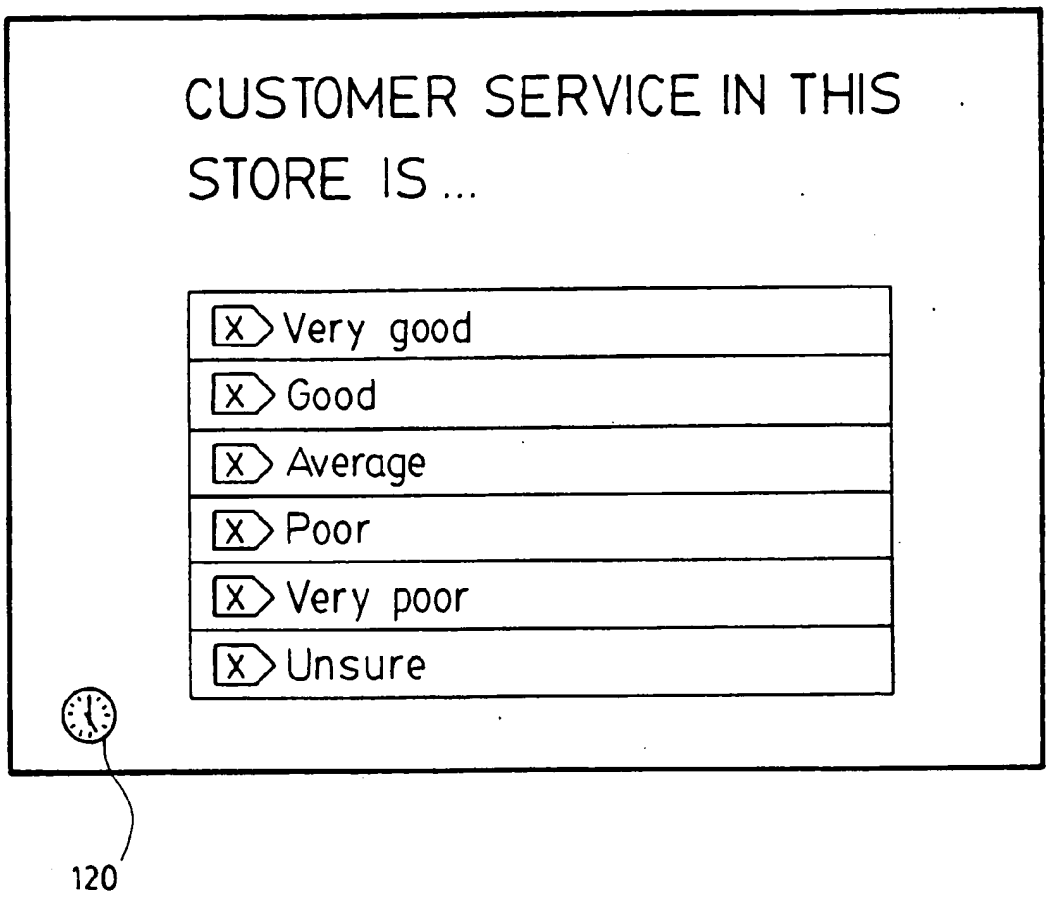

CUSTOMER SERVICE IN THIS STORE IS ...
X Very good
X Good
X Average
X Poor
X Very poor
X Unsure
120

FIG. 5

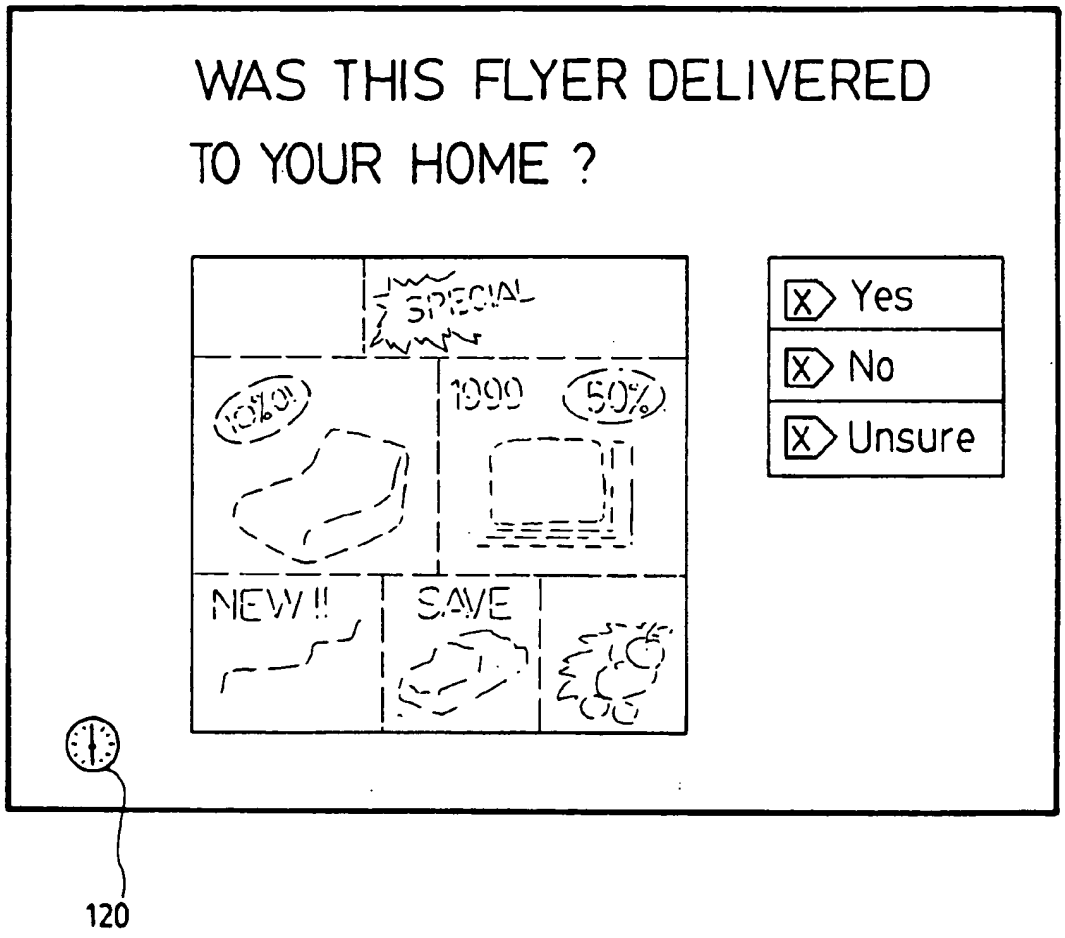

WAS THIS FLYER DELIVERED
TO YOUR HOME ?
SPECIAL
1990
50%
NEW !!
SAVE
Yes
No
Unsure
120

FIG. 6

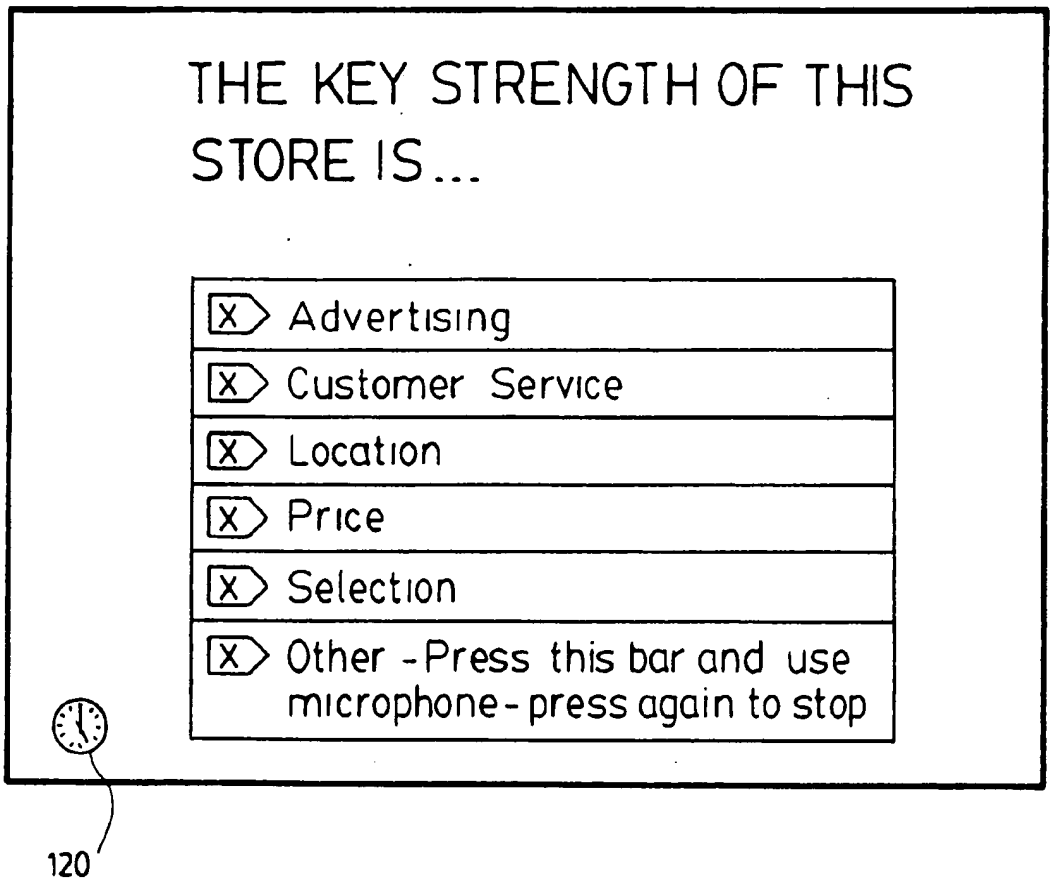

THE KEY STRENGTH OF THIS STORE IS...
X Advertising
X Customer Service
X Location
X Price
X Selection
X Other - Press this bar and use microphone - press again to stop
120

FIG. 7

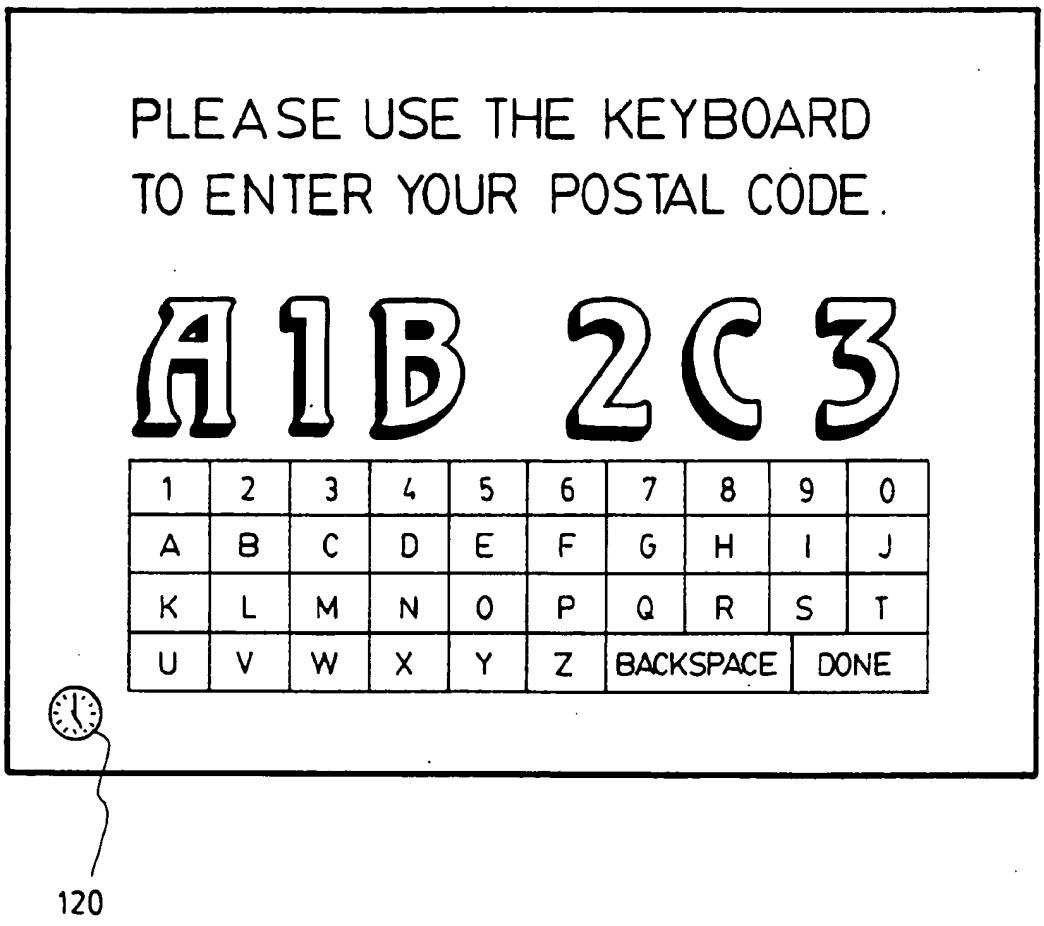

PLEASE USE THE KEYBOARD
TO ENTER YOUR POSTAL CODE.
A1B 2C3
1 2 3 4 5 6 7 8 9 0
A B C D E F G H I J
K L M N O P Q R S T
U V W X Y Z BACKSPACE DONE
120

FIG. 8

AUTOMATED SURVEY KIOSK

FIELD OF THE INVENTION

The present invention relates to the field of market research and data collection systems and devices.

DESCRIPTION OF THE PRIOR ART

For the past fifty years, the market research industry has seen a gradual refinement of traditional data gathering techniques and methodologies. Likewise, there has been a corresponding evolution and increased sophistication in the use of market and customer data by decision makers to test products, profile customers and identify new market opportunities.

Technological advancements have helped close the loop between head office decision makers and their front line operations. In the past, inventory and sales reports took days or even weeks to reach head office. Now, new technologies have increased accessibility and shortened the "data lag " from weeks to hours. Examples of these technology-driven advancements can be found in almost all parts of the business organization ranging from financial control, hourly sales reports through to instantaneous inventory tracking.

One area where business has not seen a commensurate "technology shock " is market research. Traditionally, people are surveyed obtain data that is then analysed for various purposes, such as market research, demographic data and other types of statistics.

Typically, a client wishing to obtain certain data will approach a research firm to undertake the survey, compile the data and provide a paper report of the results.

The most common method of obtaining such data is to supply employees of the research firm with questionnaires who personally, or by telephone, interview others, hereinafter referred to as "respondents", to obtain the answers to the questions. The questionnaires are then sent back to the research firm, compiled and a resulting report is transmitted to the client.

This method has the disadvantage of being labour intensive and not providing results quickly enough. Typically, depending on the survey sample, i.e. the number of people sampled, and the number of questions, the turnaround time for the information is a minimum of four to five days. This involves time to code the survey, time to input the data, time to generate tabulations and to generate the paper report. Transit time must also be included in such a process. Furthermore, for on-site, in person interviews, graphic image prompting is limited in that it is awkward to present a respondent with one or more graphic images, and even more so when feedback is requested on a flyer or brochure. Language capability is also limited in the sense that should more than one language be required to perform the survey, each employee must be provided with an edition of the questionnaire in each language, and should preferably be at least conversant in all of the languages.

Reliance on telephone and in person interviewing naturally results in a structural time lag between collecting field data and conveying survey results to decision makers. Fifty years ago an overwhelming majority of research was based on telephone or inperson interviews. The same still holds true today.

In an era where business information is increasingly commoditized, the market research industry has embraced technology primarily to refine and not to revolutionize. For example, predictive dialling (where computers screen outbound calls for live pick-up) has increased the efficiency of telephone banks. However, alternatives to traditional telephone and in-person data collection have not taken root in the market research industry.

The result is a situation where decision makers can have instantaneous and real-time access to information across their whole operation, except for market research.

It is only within the last ten years or so that a nascent attempt to explore alternative automated data-gathering techniques emerged. The following is a brief review of the relevant prior art.

U.S. Pat. No. 4,345,345 to Cadotte et al. discloses an electronic terminal for collecting opinion data from customers of an organization as to the satisfaction with the services rendered. The terminal includes a keyboard that displays inquiries to a respondent with multiple-choice responses for each inquiry. Each response is associated with a key, so that the respondent presses the appropriate key in connection with the appropriate response. Each response is electronically recorded by a microprocessor controller, and the selection is visually displayed for the respondent. The responses are permanently recorded by the controller for subsequent analysis. Similar devices are disclosed in U.S. Pat. Nos. RE 31,951 (Johnson et al.) and 5,091,877 (Itoh et al.) These devices are specifically designed to collect data electronically and transmit this data to a central memory.

A disadvantage of these devices is that they require specific programming in order to correlate the responses with the inquiries or questions. Each time the questions to a survey are modified, or a new survey created, these devices need to be reprogrammmed, which is time consuming, costly and requires the intervention of a person having expertise in programming such devices. Further, the devices mentioned above require the respondent to input the responses using the keyboard, which requires the respondent to have a substantial level of comfort with using a keyboard.

Another drawback with present surveying techniques is that the average respondent is reluctant to devote any of his or her time to complete a survey, whether by interview, completing a form or using electronic devices of the type mentioned above. In fact, many people consider it a nuisance when approached by a person conducting a survey. This is primarily due to the fact that would-be respondents fail to realize any personal gain from the otherwise time-consuming interruption of their lives. In light of this, it is believed that people would be more willing and accepting to be surveyed if there were some sort of incentive to entice the would-be respondent.

Shortfalls in the first round of automated data gathering devices resulted in two types of alternative devices being developed. The first group of alternatives, such as those described in U.S. Pat. Nos 5,361,200 (Webright et al.) and 4,355,372 (Johnson et al.) use keypads to collect real-time data. Keypad-based devices suffer from drawbacks ranging from limited language selection, incapacity to dispense coupons/incentives as well as the inability to accept open-ended responses. These devices therefore lack the flexibility required to accurately conduct on-site research in a retail setting.

The second type of alternative devices were developed for on-site research in a retail setting. Specific alternative devices include U.S. Pat. Nos 5,535,118 (Chumbley) and 5,237,157 (Kaplan). These devices, instead of relying on a keyboard or keypad for inputting a response, use a response card/punch card system. Even quasi-research devices such as the '157 patent targeted to the music industry, collect

demographic information by means of a paper-based membership application which asks for this information.

For these devices which utilize paper, respondents receive a response/punch card with questions, mark their responses on the card and insert it into the device which optically scans or reads the responses. The '118 device, for example, then dispenses a coupon as an incentive after the response/punch card is inserted into the device.

These devices have not been accepted by the mainstream market research community because of a number of serious methodological problems and lack of flexibility which undermine the accuracy and integrity of the research data.

It is generally recognized in the market research community that a central cause of bias in survey results is the order in which the questions are asked. For example, if one were asking questions on two products X and Y, to avoid bias one should alternate the order so that one begins product X questions fifty percent of the time and product Y questions fifty percent of the time. The research industry commonly refers to this alternative order approach as "skip rotations". Beginning with the same variable all of the time introduces a definite bias in the survey results.

Any type of device that relies on response/punch cards cannot, by any definition, properly administer a skip rotation. Likewise, it cannot ensure that the respondent answers the questions in proper order. The respondent may even skip critical questions. Respondents have the discretion regarding the order in which they fill out the questionnaire and which questions they decide to answer. This serious methodological flaw effectively discounts these devices as accurate and statistically valid opinion measurers.

Another serious methodological flaw involves the language bias of these devices. The past ten years has seen a tremendous surge in the importance of ethnic marketing. Multi-cultural markets across North America have been relatively untapped by the research industry. Finding interviewers to administer telephone or in-person questionnaires who are fluently multi-lingual is very difficult and prohibitively costly. The devices cited above have not been able to overcome this obstacle.

The response/punch card system cannot effectively prompt the questions in multiple languages because the device is limited by the space on the cards. For multicultural markets and settings, respondent participation will be skewed to the language on the punch card. Even if only ten percent of a target population is outside of the language on the punch-card, this would effectively bias the sample results due to non-participation of a portion of the sample. Since everyone in the target sample could not participate, confidence intervals that measure the accuracy of the survey should not be conducted due to sample bias.

Another key factor that influences the accuracy of survey results is the potential answers respondents are prompted to select from. All of the devices cited whether relying on response/punch card or keypad systems include fixed, pre-programmed responses that offer no opportunity for a response outside of the pre-determined list. For telephone or in-person interviews these responses would fall under "other " responses where respondents could provide an answer outside of the pre-determined set. None of the devices allow for open-ended questions, where a respondent can provide a special answer in their own words. Being limited to fixed answers also limits the flexibility of the research process by eliminating the use of open-ended questions. More importantly it introduces bias by forcing respondents to select from a pre-set list, because responses outside of the pre-set list cannot be recorded. The result is survey data that does not accurately reflect the full range of respondent opinion.

Measuring the impact of advertising and marketing is a critical success factor for organizations. Using traditional market research techniques, one cannot prompt images over the telephone. Likewise, as mentioned above, introducing a series of graphics (i.e. newspaper or TV ads) can be cumbersome during an in-person interview for many retail settings. In the worst case scenario, graphics might not be introduced properly or in the right order thus leading to significant bias and error in the survey results. The devices cited cannot prompt a graphic image of a newspaper, flyer or full-motion television advertisement. Market research studies have demonstrated that the most effective means of measuring awareness is to prompt the respondent with the actual graphic image.

Concerning incentives, although the Chumbley device can issue a coupon, the coupon is dispensed regardless of the number of questions that have actually been answered. Respondents could theoretically therefore fill out two questions of a 12 question questionnaire, insert the punch card and receive the coupon. These devices, therefore, at a cost to the operator, issue incentive rewards for partial completions. None of the devices cited conduct any sort of check to ensure that the whole survey was properly completed before an incentive coupon is issued.

As a result of these serious methodological and logistical problems, none of the devices can accurately collect and measure public opinion from a statistical viewpoint. Although the overall concept of automated data collection remains sound, as a result of their weaknesses, none of the devices have been accepted by the mainstream market research industry.

The devices developed to date can at best be described as technology solutions that have been applied to the market research process. The correct solution should be driven by methodological considerations, not technology.

SUMMARY OF THE INVENTION

It is thus an object of the invention to provide an automated survey kiosk which is easy to install at a location, does not necessarily require access to standard telephone lines, can be easily reprogrammed, has unlimited language capabilities and whose the data can be sent directly to a client.

In accordance with the invention, this object is achieved with an automated survey kiosk for administering a survey, the survey including a plurality of inquiries, the kiosk comprising:

a central processing unit including memory means for storing said survey and for controlling the administration of the survey;

means for sequentially displaying each inquiry in the survey;

means for receiving survey responses;

means for storing the survey responses operatively connected to the means for receiving survey responses; and

means for transmitting the survey responses to a remote location at predetermined intervals;

whereby, in use, said central processing unit displays each inquiry sequentially on said means for displaying each inquiry and prompts a respondent to answer each inquiry by selecting a response from a plurality of responses through said means for receiving the survey responses, said survey responses being stored in said

means for storing said survey responses for subsequent transmission to said remote location.

The automated survey kiosk is programmed to prompt a user for a desired language and then administer the survey in the chosen language. Furthermore, the automated survey kiosk may be remotely reprogrammed with new questions, or by deleting existing questions. The survey responses may be transmitted to the search firm, or may be directly sent to the client, who must be equipped with the proper equipment to communicate with the automated survey kiosk.

It is a further object of the invention to provide an automated survey kiosk which can accept open-ended answers. In accordance with the invention, this object is achieved with a survey kiosk of the type mentioned above, where at least one inquiry includes a choice for indicating that the respondent wishes to answer an inquiry verbally, and where the kiosk further includes a microphone and means for recording the answer.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention and its advantages will be more easily understood after reading the following non-restrictive description of preferred embodiments thereof, made with reference to the following drawings in which:

FIGS. 1(a) and 1(b) are respectively front perspective and back views of an automated survey kiosk according to a preferred embodiment of the invention;

FIG. 2 is a schematic representation of the components of the kiosk of FIG. 1;

FIG. 3 is a schematic representation of the flow of data between a kiosk, a central remote location and a client;

FIG. 4 is a view of a language selection screen;

FIG. 5 is a view of a closed-ended question screen;

FIG. 6 is a view of a graphics prompting screen;

FIG. 7 is a view of an open-ended question screen; and

FIG. 8 is a view of an alpha-numeric data capture screen.

DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

FIG. 1 shows an automated survey kiosk 1 according to the preferred embodiment of the invention, including a housing 5 having a base, front and side panels as well as a back access panel. Two locations to attach customized signage to the device are provided for users to attach customized signage. First, affixed to the front panel of the unit is an area for customized signage which includes a plexi-glass envelope. Second, attached to the top of the kiosk is a removable customized housing for signs. This customized removal sign housing is attached to the main unit by means of two gyro locks on the sides of the main unit. Signs are slid into a plexi-glass envelope and then inserted into the sign housing through a slot at the top. The back access panel includes a lock and a series of ventilation slits to facilitate the internal circulation of air. Beneath the back access panel is an opening for a retractable power cord that supplies electricity to the device. These features are not shown on the drawings since they are within the skill of one versed in the art, and form no part of the invention.

The kiosk 1 includes means for displaying a survey 3, means for receiving survey responses, a central processing unit 11, a modem 13, and preferably further includes a coupon dispenser 15, a microphone 17 and loudspeakers located within the housing 5 of the kiosk 1.

It should be understood that the central processing unit 11 may take the form of a general purpose personal computer with the usual components. The central processing unit includes means for storing a survey, such as memory means and a hard disk drive.

A typical survey to be administered will include a plurality of inquiries to be answered by a respondent. Generally, the kiosk of the invention will display each inquiry sequentially on the means for displaying the survey 3 and will prompt a respondent to answer each inquiry. The respondent enters the responses through the means for receiving survey responses, which are then stored in the means for storing the survey responses, as will be hereinafter detailed.

The means for displaying the survey 3 preferably are a touch screen monitor to collect information surrounded by a bezel frame. The touch screen monitor is comprised of 100,000 touch points per square inch. It typically requires a finger or gloved hand pressure activation of between 3 to 4 ounces (55 to 85 grams). Within five to ten milliseconds the touch activation or respondent selection is recorded by the device. The top layer of the touch screen monitor has a polyester hard surface coating with a non-glare finish.

Surrounding the monitor is a mounting bezel frame 6 (see FIG. 1). This bezel frame also helps facilitate the insertion and withdrawal of the touch screen monitor for easy maintenance and replacement. A monitor that meets the device specifications that may be used is a 17 inch resistive touch screen manufactured by KDS Pixel Touch.

The touch screen monitor is operatively connected to the central processing unit (CPU) which has the capability to run full motion video for the respondent to view. As mentioned above, the CPU can take the form of a general purpose personal computer, the requirements of which could be a Pentium 200 MHZ MMX microprocessor with 32 meg RAM, a 4.3 gigabyte hard drive and a 32 speed CD-ROM.

Preferably, the general purpose computer includes an 8 megabyte graphics accelerator which will allow for high performance 64-bit graphics for 3D, 2D and DVD picture-quality, full screen video playback. The graphics capability include true color video in any graphics modes and a full frame-rate playback as if one was watching television. This graphics accelerator will further speed the mapping and resolution of images and information to the touch screen monitor. A graphics accelerator that meets the requirements of the invention is manufactured by ATI Technologies Inc.

As mentioned previously, the kiosk 1 preferably includes a sound recording (microphone 17) and broadcasting system (loudspeakers 19) operatively connected to the CPU 11 as part of the means for receiving survey responses and the means for displaying the survey 3, respectively. It will become apparent to a person skilled in the art that the present invention permits not only traditional question-and-answer surveying, but will also easily permit graphic image prompting and sound for survey purposes. The microphone is preferably provided with an auto detect function for recording open-ended responses, as will be hereinafter explained. The system also preferable include two magnetically shielded, dynamic speakers to broadcast sound for full motion video displayed to the respondent.

Preferably, also attached to the CPU 11, is a PCMCIA drive which will be fitted into a 5.25 inch floppy disk drive bay. The drive will have the ability to accept types I, II and III PCMCIA cards. For example, a drive that meets the preferred embodiment of the invention is manufactured by Antec Inc.

Installed in the PCMCIA drive will be a modem 13 which may be hardwired and utilize the analog or digital wireless communications networks. The preferred modem is an 14.4

kbps wireless analog cellular modem which can operate on any standard analog network, although any wireless modem may be used. The purpose of using a wireless modem increases the mobility of the kiosk according to the present invention inasmuch as a separate, dedicated land line is not required. The modem can make and accept calls, in both data and voice mode. It is powered by the CPU, while inserted into a type III PCMCIA drive. For example, a wireless modem that meets the preferred embodiment of the invention is manufactured by Globewave. However, it should be understood that any type of communication network may be used, such as a dedicated land line in the case of a permanently installed kiosk, or radio frequencies other than cellular.

An incentive dispensing device **15** is also connected to the CPU **11**. Although the preferred embodiment includes a device that mechanically dispenses pre-printed coupons, a thermal or laser printer may also be used to dispense customized incentives.

The automated survey kiosk will be powered by means of a standard electrical plug attached to a standard electrical outlet. As a power back-up feature, the device may be equipped with an uninterruptible power supply (UPS) battery. The UPS battery will sense any brown-out or black-out conditions and engage itself until power is restored. Before the battery cycles its entire charge, the device will conduct an automatic shut-down of the operating programs. On-site set-up of the device requires no computer or technical expertise. Once the device is plugged in, an automated power-up routine is initiated which will set-up the program and the questionnaire for collecting respondent feedback.

The wireless modem will serve as the primary link between the automated survey kiosk **1** located on-site and an remote off-site computer **100** which will warehouse and transfer coded respondent feedback and reports to the client. The remote central processing unit **100** will also have the capability to run full motion video for the operator to view, and will be compatible with the automated survey kiosk. According to a preferred embodiment, the remote off-site computer will be substantially identical to the kiosk in terms of hardware and software, so that both may communicate adequately. It is important to note that the off-site computer **100** must be equipped with a wireless modem to communicate with the automated survey kiosk **1**.

The modem located in the kiosk is used to transfer information to multiple locations, through either a direct data up-link, the Internet or facsimile, but always through the wireless modem. Therefore, one of the key features of the kiosk is its ability to conduct multiple on-site data gathering initiatives concurrently (see FIG. **3**). For applications that involve multiple locations, each kiosk will be assigned a unique identifier which will be attached to all data collected and transferred therefrom.

The data collection and transfer processes is facilitated through a series of integrated software programs that allow for the simultaneous linking of the remote central microprocessor **100** and the kiosks **1**. In order to ensure secure communications, encryption algorithms are used to prevent unauthorized access to the data, and unauthorized access to the survey stored in the kiosk. As can be seen from FIG. **3**, the kiosk may periodically send draft aggregate reports directly to an authorized third party. Alternatively or concurrently, the kiosk periodically or upon request, sends the raw survey results to the remote off-site microprocessor **100** which performs analysis, conducts remote diagnostics, reprograms the surveys, transfers data to the client offices and essentially acts as the main data warehouse.

To facilitate the data transfer, a communication program is used. For this application the on-site automated survey kiosk will act as the host and the off-site data warehouse will serve at the remote. The remote contacts the host, logs on to the host system and both computers operate in tandem. During this link the remote operator can up/download files, perform all standard computer functions including remote hardware and software diagnostics. It should however be understood that other configurations for communication between the automated survey kiosk and the remote off-site computer can be used.

As mentioned in the Description of the prior art, language barriers, confidentiality concerns and "survey fatigue" have combined to impact the effectiveness of traditional market research approaches. These factors have especially influenced on-site, in-person interviewing. Dissatisfied customers are cynical as to whether negative evaluations conveyed to interviewers will actually be passed on to management. Likewise, many respondents are concerned that their confidential responses could be compromised. In the worst case scenario, minority language customers have no vehicle to even register positive or negative feedback. Add survey fatigue to these drawbacks and the result is a situation where collecting statistically representative research data has become increasingly difficult.

In response to these challenges, a series of devices were developed (see Description of the prior art). These devices were successful in settling confidentiality concerns. The novel use of technology to administer in-person interviews also helped reduce survey fatigue. From a methodological perspective, however, these devices lack flexibility and fail to properly address the challenges of language capability, skip rotations, prompting graphics and collecting open-ended responses. These challenges are solved by the present invention which is a touch screen, multi-media, multi-lingual wireless automated survey kiosk which gathers and transmits on-site feedback from respondents.

When the device is not being used by a respondent, a visual looping section of the program will be engaged to attract respondents to the device. Part of the attract loop may invite respondents to touch the screen, whereupon the attract loop will be broken and the user will be taken to the beginning of the questionnaire.

Referring now to FIGS. **4–8**, a graphical software interface is used to prompt a respondent with inquiries and collect data from respondents. This interface has the ability to prompt and administer the questionnaire in multiple languages, conduct skip rotations, display still and moving images as well as collect respondent feedback through the touch screen monitor. This software program will be linked to a program which will warehouse the data and perform statistical tabulations. SPSS, an advanced statistical program used by the market research industry, may be used to perform these functions.

Once into the questionnaire portion of the program, the respondent will be presented with the questions one at a time. Selecting a response will automatically take the user to the next question. All questions will be presented in a text format using a large, easy to read font and may include graphic images. Each of the questions will include a series of answers that will include the text and buttons. The number of buttons appearing on the screen will correspond to the number of possible answers. Respondents will be able to register a response by either touching the relevant button or the relevant answer text (see FIG. **5**). Once a selection is made, an alpha-numeric code will be assigned to the answer and the kiosk will initiate the next appropriate question.

As the respondent answers questions a status indicator **120**, displayed on the touch screen monitor, will track the respondents progress through the questionnaire (see FIGS. **4–8**). For example, once the respondent is half way through the questionnaire, the status indicator will indicate that 50 percent or one-half of the questionnaire has been completed. The status indicator may take the form of a numeric value, pie chart or progress bar. Visually showing the respondent the progress status diminishes the number of mid-interview terminations.

Each time the respondent touches the screen to enter a response a "beep " will be broadcast by means of the speakers (see FIG. 1) to confirm that a selection has been made. Likewise, as soon as the attract loop is broken the date and time of day is recorded by the microprocessor and an interview timer is activated. This will be used to calculate the number of seconds required to complete the interview.

After the attract loop is broken the first screen will prompt the respondent to select the preferred language to conduct the interview (see FIG. 4). The screen may use translations of the phrase "continue in. . . . " in each of the respective interview languages to facilitate the language choice selection. Once the language preference is identified by the respondent by touching the appropriate button or text, the device will conduct the complete interview in the language selected.

Fundamentally, there are five types of questions that may be introduced by the device: questions without graphic images; questions with graphic images; questions with open-ended responses; skip-rotation questions; and questions that allow for alpha-numeric inputting.

Standard, closed-ended questions without graphic images, will include the text of the question and a limited selection of answers. For example, the device may be used to demographically profile respondents by asking them to select an answer to a question (see FIG. 7). In this case, respondents will be prompted with a series of fixed selections based on the needs of the research project.

The second type of question initiated by the device will include the ability to visually prompt images ranging from still-life to full-motion video. In this case, the device will introduce the images on the screen as well as a series of potential responses. For example, a common use of graphics involves benchmarking the awareness of print advertising vehicles such as newspaper flyers. In this instance, the image of a specific flyer may be prompted (see FIG. 6) and the respondent may be asked if they remember seeing the specific flyer. Likewise, a full-motion video clip of a television commercial may be played and the respondent may be asked to provide an evaluation.

The third type of question that may be initiated by the device will allow for the respondent to provide an open-ended response. In this case, one of the answer choices may include the option to record a verbal response. These types of questions usually apply to situations where a wide variety of responses may be encountered. For example, a respondent may be asked their motivation for shopping at a particular store (see FIG. 7). In this instance, if the preferred answer is not included in the list of prompted answers, the respondent will have the ability to select "other, record your answer here " and record, in his or her own words, their answer by using the microphone situated above the touch screen monitor (see FIG. 1). Recorded open-ended responses will be linked to the data file through the identification number automatically assigned to the interview.

The fourth type of question that may be initiated by the device is that of a skip rotation. In this instance, questions are rotated in order to minimize bias. For example, if a survey project was being conducted on three products, say products X, Y, and Z, the device would have the ability to rotate the order in which the questions are introduced to the respondent so that any bias is eliminated. The question rotation would be as follows:

Question Order Respondent 1—Product X, Product Y, Product Z

Question Order Respondent 2—Product Y, Product Z, Product X

Question Order Respondent 3—Product Z, Product X, Product Y

Rotation Complete—Begin Skip Rotation Again

Question Order Respondent 4—Product X, Product Y, Product Z

Apart from questions being rotated, answers to a question may also be rotated to minimize any potential bias based on the order in which the answer selections are prompted. The ability to properly administer skip rotations guarantees that the interview will be administered and data collected without bias.

The fifth type of question that may be initiated by the device involves collecting alpha-numeric information. In this case, the respondent may be presented with a virtual keyboard displayed on the touch screen (see FIG. **8**). As a selection is made it is displayed on the touch screen. The respondent will also have the ability to edit, by using a "backspace " button, any alpha-numeric responses before selecting the "done " button to confirm the response. For example, if the device was being used in a jurisdiction such as Canada, this capability would be necessary to collect a respondents alpha-numeric postal code (see FIG. **8**). This alpha-numeric data capturing capability will also allow the device to collect information on complex product codes, transaction number or unique identifiers.

Immediately following the last question, the respondent will be presented with a thank you screen. The screen will remain displayed for approximately five seconds before the incentive dispensing mechanism is activated and an coupon is issued. Coupons are only issued if all the questions have been answered by the respondent. Once the thank you screen has been displayed and the coupon dispensed, the device will automatically return to the attract loop. At this point the program resets itself in preparation for the next interview.

Before the program resets itself, an identification number may be assigned to the interview. Apart from the answer selections made by the respondent, the program will automatically link the time and date the attract loop was broken as well as the total duration of the interview in seconds to the identification number. All of this information will be initially stored in the CPU and then transferred to the data warehouse in the remote central microprocessor.

Each interview record will be saved in a standard ASCII format. The preferred ASCII format will be comma delineated with a hard return at the end of the record. No blank spaces will be allowed. The following is an example of the type of record which may be used:

"12:15PM,03/15/1998,55,1,2,8,4,5,3,1,M1K1N8"

which includes the date and time the attract loop was broken, the length in time of the interview and the alpha-numeric coded answers of the respondent.

In the case of an incomplete record resulting from a mid-interview termination, questions with answers will be logged normally. The device will automatically pad blanks (questions not answered) with the integer zero ("0"). Incorporating this feature into the device will avoid the require-

ment for a parsing routine for blank spaces. Likewise, unanswered alpha-numeric responses may be replaced with "XXXXX" to ensure the file is complete. However, other forms of storing the data are well within the purview of a person skilled in this field.

At any time during the research process, even while the respondent is entering responses, data can be transmitted via telecommunications link from the host to any remote location. Although for most projects a daily data report is sufficient, data may be transferred hourly or even in a real-time fashion to the data warehouse in the remote central microprocessor.

Once the information is transferred to the data warehouse in the remote central microprocessor a series of automated data checking and validation procedures are initiated. Any interviews conducted outside of business hours, potentially conducted by employees or other non-qualified respondents, are disqualified from the batch of valid interviews. An algorithm then calculates the reading and completion time for each interview and disqualifies interview sessions where the questions were not likely read. This eliminates instances where a potential respondent randomly made selections as quickly as possible without reading the questions.

Upon completion of the checking and validation procedures, individual interview records and aggregate reports are transferred electronically to the client into a customized data warehouse by the remote central microprocessor via a telecommunications link. Receiving individual data records will allow the client to conduct in-house longitudinal and customized queries on demand. The device will also have the capability to automatically generate and transmit draft aggregate fax reports to identified fax recipients.

Among the key advantages of the device is its remote capability. Surveys can be changed, new languages reprogrammed and revised graphics can be uploaded while the device is still in the field, even if it is being used by a respondent. Likewise, hardware and software diagnostics can also be conducted remotely. This remote capability significantly reduces operational costs on a number of levels. In the case of repairs, remote diagnostics mean on-site technician time can be minimized.

With the ability to remote retrieve data and change the questionnaire the device can be deployed directly to new clients and research projects without returning to head office or requiring an on-site technician visit. If the device is situated in a market with a special cultural group it can be reprogrammed via the telecommunications link with the additional language(s). When on-site access is required, the device can be accessed by means of a password embedded into one of the alpha-numeric questions.

For any research project, a series of devices can be deployed on-site and remote accessed and reprogrammed by the remote central microprocessor. At any given time each on-site device will automatically forward survey feedback. Likewise, each of the surveys can be customized to meet special site needs. For example, many retail clients are interested in profiling the local newspaper and television watching habits of their customers. In this particular instance, each device would be remotely programmed to include questions which prompt on the specific newspaper and television organizations in that market. The result is a significant degree of flexibility, on-site questionnaire customization for micro-markets and reduced costs.

The advantages of having an automated survey kiosk as described are the following: almost instantaneous results for the client, minimal labour, increased flexibility in the types of questions, languages and graphic prompting for customer reaction, ease of installation and ease of reprogramming. Additionally, the kiosk is lightweight, which, combined with the reprogrammability, makes it very versatile in moving and adapting the kiosk to another environment.

Although the present invention has been explained hereinabove by way of a preferred embodiment thereof, it should be pointed out that any modifications to this preferred embodiment within the scope of the appended claims is not deemed to alter or change the nature and scope of the present invention.

What is claimed is:

1. An automated survey kiosk for administering a market survey, said market survey being translated into at least two languages, said market survey including a plurality of inquiries, said kiosk comprising:

a central processing unit including memory means for storing said survey and for controlling the administration of the survey;

means for prompting a user to choose between said at least two languages and for receiving the choice of the user;

a video screen for sequentially displaying each inquiry in the survey in the chosen language in an order which changes from time to time;

means for receiving survey responses;

means for storing the survey responses operatively connected to the means for receiving survey responses; and

means for transmitting the survey responses to a remote location

whereby, in use, said central processing unit displays each inquiry sequentially on said video screen and prompts a respondent to answer each inquiry by selecting a response from a plurality of responses through said means for receiving the survey responses, said survey responses being stored in said means for storing said survey responses for subsequent transmission to said remote location; and wherein said survey includes at least one inquiry permitting a verbal response, said plurality of responses including a response indicating that the respondent wishes to enter a verbal response, where said means for receiving survey responses further include a microphone and said means for storing survey responses include a voice recorder, whereby, in use, when a respondent selects said response indicating that the respondent wishes to enter a verbal response, said central processing unit indicates to said means for storing a survey response to record a signal coming from said microphone.

2. An automated survey kiosk according to claim 1, wherein said video screen is a touch-screen, whereby said means for receiving survey responses are integrated in said touch screen.

3. An automated survey kiosk according to claim 2, wherein said means for storing the survey responses are integrated in said central processing unit.

4. An automated survey kiosk according to claim 3, wherein said survey kiosk further includes means for dispensing an incentive to said respondent when all of the inquiries in the survey have been answered.

5. A system for gathering market survey responses, said market survey being translated into at least two languages, said system including:

at least one automated survey kiosk, said at least one automated survey kiosk comprising:

a central processing unit including memory means for storing said survey and for controlling the administration of the survey;

means for prompting a user to choose between said at least two languages and for receiving the choice of the user;

a video screen for sequentially displaying each inquiry in the survey in the chosen language in an order which changes from time to time;

means for receiving survey responses;

means for storing the survey responses operatively connected to the means for receiving survey responses; and

means for transmitting the survey responses to a remote location;

wireless means located at a central location for remotely sending information to said at least one automated survey kiosk and for receiving said survey responses for processing;

means located at a client's location for remotely receiving, at said predetermined intervals or upon request, said survey responses;

whereby, in use, said central processing unit displays each inquiry sequentially on said video screen and prompts a respondent to answer each inquiry by selecting a response from a plurality of responses through said means for receiving the survey responses, said survey responses being stored in said means for storing said survey responses for subsequent transmission to said remote location; and wherein said survey includes at least one inquiry permitting a verbal response, said plurality of responses including a response indicating that the respondent wishes to enter a verbal response, where said means for receiving survey responses further include a microphone and said means for storing survey responses include a voice recorder, whereby, in use, when a respondent selects said response indicating that the respondent wishes to enter a verbal response, said central processing unit indicates to said means for storing a survey response to record a signal coming from said microphone.

6. An automated survey kiosk according to claim 5, wherein said video screen is a touch-screen, whereby said means for receiving survey responses are integrated in said touch screen.

7. An automated survey kiosk according to claim 6, wherein said means for storing the survey responses are integrated in said central processing unit.

8. An automated survey kiosk according to claim 7, wherein said survey kiosk further includes means for dispensing an incentive to said respondent when all of the inquiries in the survey have been answered.

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